

INTERNATIONAL ATOMIC WEIGHTS

Element	Sym- bol	Atomic Weight	Element	Sym- bol	Atomic Weight
Aluminium ..	Al	26.97	Molybdenum ..	Mo	95.95
Antimony ..	Sb	121.76	Neodymium ..	Nd	144.27
Argon ..	A	39.944	Neon ..	Ne	20.183
Arsenic ..	As	74.91	Nickel ..	Ni	58.69
Barium ..	Ba	137.36	Nitrogen ..	N	14.008
Beryllium ..	Be	9.02	Osmium ..	Os	190.2
Bismuth ..	Bi	209.00	Oxygen ..	O	16.0000
Boron ..	B	10.82	Palladium ..	Pd	106.7
Bromine ..	Br	79.916	Phosphorus ..	P	30.98
Cadmium ..	Cd	112.41	Platinum ..	Pt	195.23
Calcium ..	Ca	40.08	Potassium ..	K	39.096
Carbon ..	C	12.010	Praseodymium ..	Pr	140.92
Cerium ..	Ce	140.13	Protoactinium ..	Pa	231
Cesium ..	Cs	132.91	Radium ..	Ra	226.05
Chlorine ..	Cl	35.457	Radon ..	Rn	222
Chromium ..	Cr	52.01	Rhenium ..	Re	186.31
Cobalt ..	Co	58.94	Rhodium ..	Rh	102.91
Columbium ..	Cb	92.91	Rubidium ..	Rb	85.48
Copper ..	Cu	63.57	Ruthenium ..	Ru	101.7
Dysprosium ..	Dy	162.46	Samarium ..	Sm	150.43
Erbium ..	Er	167.2	Scandium ..	Sc	45.10
Europium ..	Eu	152.0	Selenium ..	Se	78.96
Fluorine ..	F	19.00	Silicon ..	Si	28.06
Gadolinium ..	Gd	156.9	Silver ..	Ag	107.880
Gallium ..	Ga	69.72	Sodium ..	Na	22.997
Germanium ..	Ge	72.60	Strontium ..	Sr	87.63
Gold ..	Au	197.2	Sulphur ..	S	32.06
Hafnium ..	Hf	178.6	Tantalum ..	Ta	180.88
Helium ..	He	4.003	Tellurium ..	Te	127.61
Holmium ..	Ho	164.94	Terbium ..	Tb	159.2
Hydrogen ..	H	1.0080	Thallium ..	Tl	204.39
Indium ..	In	114.76	Thorium ..	Th	232.12
Iodine ..	I	126.92	Thulium ..	Tm	169.4
Iridium ..	Ir	193.1	Tin ..	Sn	118.70
Iron ..	Fe	55.85	Titanium ..	Ti	47.90
Krypton ..	Kr	83.7	Tungsten ..	W	183.92
Lanthanum ..	La	138.92	Uranium ..	U	238.07
Lead ..	Pb	207.21	Vanadium ..	V	50.95
Lithium ..	Li	6.940	Xenon ..	Xe	131.3
Lutecium ..	Lu	174.99	Ytterbium ..	Yb	173.04
Magnesium ..	Mg	24.32	Yttrium ..	Y	88.92
Manganese ..	Mn	54.93	Zinc ..	Zn	65.38
Mercury ..	Hg	200.61	Zirconium ..	Zr	91.22

**The
Pharmaceutical Pocket Book**

THE PHARMACEUTICAL POCKET BOOK



FOURTEENTH EDITION

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the Council of the
Pharmaceutical Society of Great Britain

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1943-1944

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PREFACE

The Pharmacy Students' Pocket Note-book was originally produced in 1906 under the editorship of the late Mr. John Humphrey. Subsequent editions appeared in various forms under the same editorship until 1923, when the task of revision was delegated by the Council of the Pharmaceutical Society to the Science Committee. The eleventh edition, published in 1925, was the result of a thorough revision which rendered the work of a more permanent character than its predecessors. The twelfth and thirteenth editions, together with the present edition, have been produced under the supervision of the Codex Revision Committee.

The Pharmaceutical Pocket Book, in the course of its evolution, has come to serve a dual purpose. It serves to introduce to students of pharmacy the fundamental principles on which the practice of their profession is based and it serves as a useful reference book to the practising pharmacist. The changing character of pharmacy is reflected in the subject matter of the Pharmaceutical Pocket Book and opportunity has been taken in the present revision to remove sections which are no longer considered useful to the student or pharmacist, whilst modification and expansion of other parts of the book have been found necessary.

The extent to which revision has been carried out is indicated in the following notes which refer to the various sections in the book:—

Activities of the Society. A more comprehensive picture is given of the activities of the Society, whilst the matter relating to the qualifying examinations has been revised to include information useful to the student.

The Science and Art of Pharmacy. This section has been included to indicate the scope which modern pharmacy offers to the student and the fields of science covered by pharmacy.

Dispensing. The paragraphs dealing with emulsions have been re-written and information included on some of the recently introduced emulgents. Notes on the ointment bases of the Sixth Addendum to the British Pharmacopœia have been added and the section on sterilisation has been re-written in the light of the alterations made in the official methods.

Equivalent Formulæ and Doses of Official Medicaments. Additions to the B.P. Addenda and modifications of existing formulæ as a result of war-time conditions have necessitated considerable revision of these sections.

Forensic Pharmacy. In the previous edition, information relating only to Poisons Law was included, but it has now been considered advantageous to expand this section to include the many Acts relating

to Dangerous Drugs, Pharmacy and Medicines, Therapeutic Substances, Food and Drugs, National Health Insurance, etc. As a result of this revision, the student will find the book a useful guide to the study of Forensic Pharmacy for the qualifying examinations and the practising pharmacist is provided with a complete summary of the legislation covering his profession.

Poisoning. A complete revision has been carried out of existing information and additions have been made to the list of antidotes and the table dealing with treatment in special cases of poisoning.

Biochemical Analysis. The increasing importance to the pharmacist of a knowledge of biochemical analysis has been recognised in this section, which has been enlarged and contains not only additional information on urine, blood and gastric contents, but includes also details of tests applied to cerebrospinal fluid and faeces. Whilst, in general, the matter included has been selected from a practical viewpoint, the theoretical considerations underlying many of the tests are discussed.

Notes on Bacteriology. In re-writing this section, opportunity has been taken to give a more complete account of bacteriology in its relation to pharmaceutical preparations. Notes are also included on antiseptics and the bacterial preparations of the pharmacopœia.

Food and Diet. Recent developments in the field of nutrition have rendered necessary the revision of these chapters. Information has been included on the minimum nutritional requirements in health and the matter relating to vitamins has been incorporated in this section. A useful table stating the vitamin contents of official preparations has been added.

The Endocrine Organs. The subject matter of this section has been revised and brought up to date.

Veterinary Posological Table. Useful notes have been included on veterinary posology and the table has been completely overhauled in the light of more recent knowledge and expanded to include new drugs used in veterinary medicine.

Synonyms and Trade Names. Additions have been made in order to bring the table up to date with respect to the B.P. Addenda, B.P.C. Supplements and new proprietary preparations.

Acknowledgments. The thanks of the Society are due to the General Medical Council, from whom permission was received to incorporate information from the Pharmacopœia and Addenda relating to formulæ, alcohol strengths, sterilisation and equivalent Metric and Imperial doses. The Council of the Society desire to record their indebtedness to the contributors who have assisted and to the office staff who have been engaged on the work of revision.

December, 1943.

CONTENTS

	PAGE
Atomic Weights	<i>Inside Front Cover</i>
The Pharmaceutical Society of Great Britain	1
Activities of the Pharmaceutical Society	1
On Entering Pharmacy	7
Examination Chart	11
The Science and Art of Pharmacy	12
Dispensing	14
Sterilisation of Medicaments	67
Percentage Solutions	76
Homœopathic Pharmacy	77
Equivalent B.P. Formulæ	80
Proportions of Active Ingredients in B.P. Preparations	116
Doses of Official Medicaments	121
Doses Proportionate to Age	133
Equivalent Metric and Imperial Doses	133
Abbreviations used in Prescriptions	134
Weights and Measures, Imperial	144
Weights and Measures, Metric	146
Metric and Imperial Equivalents	149
Equivalent Measures of Length	152
Equivalents of Weights or Measures of Mass and Capacity	153
Miscellaneous Factors	155
Greek Alphabet	155
Hydrogen Ion Concentration	156
Hydrometers	161
Alcohol in Medicinal Preparations	164
Dilution of Alcohol	165
Alcoholic Strengths of B.P. Preparations	167
Table of Solubilities	169
Removal of Stains	181
Thermometric Equivalents	182
Freezing Mixtures	184

	PAGE
Forensic Pharmacy	186
Pharmacy and Poisons Act, 1933	186
Poisons List	195
Schedules to the Poisons Rules	197
Pharmacy and Medicines Act, 1941	209
Dangerous Drugs Acts	212
Therapeutic Substances Act, 1925	226
Sale of Food and Drugs Act, 1938	228
Acts and Regulations Relating to Wines and Spirits	230
National Health Insurance	237
Shops Acts, 1912-1936	240
Cancer Act, 1939	242
Venereal Diseases Act, 1917	242
Sale of Abortifacients	243
Legislation for Protection of Animals	243
Poisoning	244
Symptoms and Antidotes	244
Treatment in Special Cases	249
Medicinal and Fatal Doses of Poisons	260
Biochemical Analysis	263
Examination of Urine	263
Examination of Blood	273
Examination of Cerebrospinal Fluid, Gastric Contents, etc.	278
Notes on Bacteriology	283
Food and Diet	293
Vitamin Contents of Official Preparations	302
The Endocrine Organs	304
Veterinary Posological Table	309
Materia Medica of Vegetable and Animal Origin	324
Dictionary of Synonyms and Trade Names	342
Index	419
Logarithms and Antilogarithms	page 424 et seq.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN

The Society was founded on April 15, 1841, at a meeting of some of the most prominent chemists of that time who realised the importance of a central organisation to protect the interests of the chemist and to increase his usefulness to the community. On February 18, 1843, less than two years after its formation, the Society was granted a Royal Charter of Incorporation and thereby acquired a permanent status.

Up to the end of 1933 it was a voluntary association, membership being restricted to registered Pharmaceutical Chemists and Chemists and Druggists. Evidence that its activities met with loyal support is to be found in the fact that out of some 23,000 registered persons at that time approximately 16,000 were Members.

On December 31, 1933, in consequence of new legislation in the form of the Pharmacy and Poisons Act, 1933, the voluntary nature of the Society ended, and every person registered as a Pharmaceutical Chemist or Chemist and Druggist became, by virtue of registration, a Member of the Society, and a compulsory annual fee for registration took the place of the voluntary annual subscription for membership. On December 31, 1942, there were 25,133 Members of the Society.

Every person registered with the Society as an "Apprentice or Student" is automatically elected a Student-Associate of the Pharmaceutical Society and so is able to participate in the activities of his local branch of the Society. In this way he will gain an early experience of dealing with men and affairs which will enable him later on to take an active part in the development of the branch and of his Society.

Although the general supervision of the activities of the Society is in the hands of the Privy Council, the government of the Society is vested in a Council consisting of twenty-one members elected by the general body of Members and three persons nominated by the Privy Council. Seven of the elected members retire annually, but are eligible for re-election. The headquarters of the Society are situated at 17, Bloomsbury Square, London, W.C.1. In order to assist in the work of the Society in Scotland the North-British Branch was formed, and in 1884 premises were purchased at 36, York Place, Edinburgh. These premises include a Museum, a Library and Laboratories. The affairs of the North-British Branch are delegated by the Council of the Society to the North-British Executive and a Resident Secretary is appointed.

THE ACTIVITIES OF THE SOCIETY

Since the granting of the Charter in 1843, Parliament has supplemented the duties of the Society very considerably, but its primary activities are still the four chartered functions, a brief review of which is given below.

THE ADVANCEMENT OF CHEMISTRY AND PHARMACY

Research. The Society has consistently fostered research in its own laboratories and in the pharmaceutical departments of the schools that it approves. To-day some £4000 is expended annually upon the upkeep of research laboratories. Workers from all parts of the world have come to the laboratories in Bloomsbury Square and the annual reports bear evidence of the value of the research work carried out there. The importance of the Pharmacological Laboratories and the Nutrition Department is evidenced by the numerous calls upon their services from this country and abroad. Research work upon biological standardisation and upon medicinal or food substances containing vitamins continues to be carried out.

The British Pharmacopœia. When the Medical Council had direct responsibility for the production of the pharmacopœia wide use was made of the knowledge of practising pharmacists and members of the staff of the Society's School, some of whom acted either as advisors or editors. At a later date a Pharmacopœia Commission was set up and to-day members of the teaching staff of the School as well as other pharmacists serve on the Commission or on its numerous committees.

Scientific Meetings. From the early days of the Society these meetings have been held regularly, and although the British Pharmaceutical Conference is now the main occasion for the presentation of recent research work, a series of five evening meetings is arranged annually at which persons eminent in pharmacy or the allied sciences are invited to address the members on subjects of general scientific interest.

British Pharmaceutical Conference. Founded in 1863 and continued without interruption, the Conference has as its object the discussion of subjects relative to Pharmacy and the furtherance of the objects of the Charter. The general control of the Conference is in the hands of an executive committee upon which the Council of the Society is represented by four members. The President of the Society is *ex-officio* President of the Conference and the members present at its annual meeting elect the Chairman for the following year. Both the Conference and the evening meetings greatly assist in the promotion of friendly reunion of pharmacists and those interested in Pharmacy.

Publications. The Society's publications are varied and embrace every aspect of pharmaceutical training and practice. The more important are the *Pharmaceutical Journal*, the *Quarterly Journal of Pharmacy and Pharmacology*, the *British Pharmaceutical Codex*, *Martindale's Extra Pharmacopœia*, the *Pharmaceutical Pocket Book*, the *Register of Pharmaceutical Chemists and Chemists and Druggists*, and a *Calendar*.

Library. The Library contains some twenty thousand works of scientific and general interest. These may be consulted in the Library or, subject to the Library Regulations, may be sent by post to Members and Student-Associates. In addition to Members and Student-Associates of the Society the Library is frequently consulted by members of other

scientific societies. The Librarian also receives inquiries for assistance in the tracing of references of widely differing subjects, and freely advises upon the most useful books to consult. Arrangements have been made with other libraries whereby the Society can obtain almost any book of scientific interest not included in the Library, and in this way an exceedingly efficient and up-to-date service is provided. Approximately 8000 books are borrowed by members annually and about 4000 persons visit the Library in the course of a normal year.

Museum. The Museum contains a comprehensive collection of *Materia Medica*, which is available for inspection by Members and Student-Associates of the Society and by other persons interested in drugs. The type specimens are well arranged and may easily be examined. They also prove of exceptional value in enabling a decision to be reached in regard to the authenticity of drugs of doubtful origin. At the present time, 1943, the museum is closed and the principal collections of drugs have been removed to safer quarters in the provinces.

Post-Graduate Courses. Post-graduate diplomas in Pharmaceutical Analysis and in Biochemical Analysis are awarded by the Council on the recommendation of the Examiners appointed for the purpose. Only Members of the Society are eligible to sit for the examinations, and to those who desire to undertake such specialised work the diplomas provide a means of establishing their ability to do so.

THE PROMOTION OF A UNIFORM SYSTEM OF EDUCATION

The Society has always taken a close interest in the welfare of its students and up to 1914, grants were made to local associations to assist in the provision of facilities for study. Since that date development has followed the lines of approved courses of study. Pharmaceutical Departments are now available in several of the Universities. Local authorities, too, have contributed by the provision of classes, and in most cases it is now possible for a student to complete at least part of his training reasonably close to his home.

Education and Examination. Under the supervision of the Privy Council, the Society is responsible for the education and examination of persons wishing to become pharmacists. These activities are regulated by examination regulations made under the Bye-Laws, and are summarised on pages 9 to 11; the regulations are obtainable free of charge on application to the Registrar, 17 Bloomsbury Square, London, W.C.1. For the training of students in accordance with these regulations the Society inspects and approves a considerable number of educational institutions. The examinations are held both in London and Edinburgh. For this purpose two Boards of Examiners are appointed, one for England and the other for Scotland.

The College of The Pharmaceutical Society of Great Britain. The College comprises a School of Pharmacy and Pharmacological Laboratories, and is a School of the University of London. Its activities

include the training of graduates in Pharmacy and the provision of facilities for research leading to the degree of Doctor of Philosophy. The School of Pharmacy—founded in 1842—provides training for the qualifying examinations of the Society, for the degree of Bachelor of Pharmacy of the University and for higher degrees. The Research Laboratories in the School were founded in 1888. Reference has already been made to the Pharmacological Laboratories and to the large amount of valuable work carried out in the College.

Scholarships and Prizes. Several valuable scholarships are awarded by or on the recommendation of the Council. Full details of these and the regulations governing their award are contained in the Calendar of the Society and the booklet "Pharmacy as Career" or may be obtained from the Registrar of the Society. The most recent addition is the institution of what is to be known as the Charter Travelling Scholarship which will commemorate the Centenary of the granting of the Charter. In view of the nature of the scholarship it will not be possible to make the first award until after the war.

THE PROVISION OF A FUND FOR THE RELIEF OF DISTRESSED MEMBERS OF THE SOCIETY AND OF THEIR WIDOWS AND ORPHANS

The Benevolent Fund. This Fund was instituted in 1841 by means of subscriptions from individual members for the chartered purpose given above. The Pharmacy Act 1868 extended the application of the fund to all persons registered as Pharmaceutical Chemists or Chemists and Druggists, whether connected with the Society or not. The fund is financed partly from the income of invested capital and partly from annual subscriptions; it is administered by a Committee of the Council and no genuine cases of necessity are refused assistance. Since 1865, permanent assistance has been afforded by the granting of annuities, and there are over 60 annuitants receiving a fixed income from the fund. In addition to the annuitants approximately 150 applications for grants are received during a year, and in almost every case a grant is made.

War Auxiliary Benevolent Fund. The fund was founded at the conclusion of the Great War as a supplement to the Society's Benevolent Fund so as to enable assistance to be given to certain persons whose misfortunes arose through the war and who were not eligible to receive assistance from the Benevolent Fund. Over £23,000 was collected but the fund was exhausted in the early months of the Second World War.

War Aid Fund. Formed to assist those in distress in the present war, this fund has received widespread support. At the present time it has reached a total of over £24,000, generous contributions having come from Australia, Canada, India, Rhodesia, South Africa, and the United States of America. It is at the service of the civilian pharmacist in the front line, widows and orphans, and prisoners of war.

Orphan Fund. This fund, which is dependent upon legacies, donations and subscriptions, is applied at the discretion of the Council to assist or purchase the election of orphans to orphan schools.

THE PROTECTION OF THOSE WHO CARRY ON THE BUSINESS OF CHEMISTS AND DRUGGISTS

Registration. The Pharmacy Acts of 1852 and 1868, as amended, provide for the registration by the Society of all persons who have obtained from the Examiners appointed under those Acts a certificate of competent skill and knowledge and the qualification to carry on the business of a Pharmaceutical Chemist or a Chemist and Druggist. Further, all premises in which drugs are sold by retail by pharmacists must be registered with the Society.

Inspection of Shops: Prosecutions. By the Pharmacy and Poisons Acts of 1852 to 1933, the duty of instituting proceedings against persons contravening the law is imposed upon the Society. To this end the Society employs inspectors whose duty it is to visit all pharmacies in England, Scotland and Wales and any other shop where there is reason to believe that certain offences under the Acts may be committed. It has long been a matter of regret to pharmacists that Parliament has so closely linked pharmacy legislation with the control of poisons. Nevertheless, the public has for over sixty years benefited from the control that the pharmacist has exercised over their distribution, while the Pharmaceutical Society has taken over large administrative responsibilities the cost of which would otherwise have fallen on public funds.

Statutory Committee. An outstanding provision of the 1933 Act seeks to maintain the value of the qualification by the institution of this disciplinary committee which brings pharmacists and corporate bodies under its control. This enables pharmacy itself to create standards of professional conduct, and strengthens the hands of the individual pharmacist in his dealings with the State, local authorities and employers.

Branch Organisation. The association of members with the conduct of the Society's affairs was brought closer in 1922, when branches of the Society were set up throughout Great Britain. Members and Student-Associates are automatically members of a Branch of the Society, and every person connected with the Society is thereby enabled to share in the activities of the parent body. There are 127 Branches in England and Wales and five in Scotland. The Society not only provides a fund for each Branch, the amount of which is dependent upon the number of Members and Student-Associates attached, but is also prepared to arrange for lecturers to address the meetings. The Branches in their individual and collective capacities are sources of strength and help to the Society which refers to them from time to time matters upon which the opinion of their Members can be taken. Attendance at Branch meetings and the social functions associated with them tends to provide that basis of good-fellowship so necessary for effective progress.

SPECIAL PRIVILEGES OF MEMBERS AND STUDENT-ASSOCIATES

In addition to the knowledge that they are supporting the activities of the Society outlined above, Members and Student-Associates of the Society receive a number of special privileges. These are:—

Members

In addition to the privileges conferred by the Pharmacy and Poisons Acts, 1852–1933, members of the Society are entitled to the following privileges:—

1. To attend all meetings of the Society.
2. To hold office as Members of Council and as Auditors.
3. To receive a copy of the *Pharmaceutical Journal* weekly and to obtain certain of the Society's publications such as the *Quarterly Journal of Pharmacy and Pharmacology* at a special price.
4. To attend meetings and other functions of a local branch of the Society.
5. To use the Museum.
6. To use the Library, from which books can be obtained on written or personal application, the Society paying the carriage one way for borrowers residing in the provinces. (Any book of scientific interest which is not included in the Library can usually be obtained by the Librarian.)
7. To make use of the rooms in the Society's House which are placed at the service of Members for business interviews and general conversations.
8. To vote for the election of the Council and Auditors, and for the election of Annuitants on the Benevolent Fund.
9. To hold the Rammell Studentship.
10. Under certain conditions to compete for the Pereira Medal and Council Prizes.

Student-Associates

Under the Bye-Laws of the Society every person registered as an "Apprentice or Student" in accordance with Section 10 of the Pharmacy Act, 1852, automatically becomes a Student-Associate of the Society. The following are the privileges of Student-Associates:—

1. To attend the evening meetings of the Society.
2. To receive the *Pharmaceutical Journal* weekly on payment of a preferential annual subscription of 10s. 6d.
3. To use the Museum.

4. To use the Library, from which books can be obtained on written or personal application, the Society paying the carriage one way for borrowers residing in the provinces.
5. To enter for the Jacob Bell Scholarship, the three Leverhulme Scholarships, the two Nottingham University College Studentships in Pharmacy, the Herbarium Prize, and, under certain conditions, the Manchester Pharmaceutical Association Scholarship, the Devon and Cornwall Exhibition in Pharmacy and the Petrie Trust Bursary.
6. If registered as an "Apprentice or Student"
 - (a) on or after March 25, 1941, to attend meetings and other functions of the local branch of the Society during a period of seven years from the date of such registration and thereafter upon payment of such fee as may be determined by the local branch of the Society;
 - (b) before March 25, 1941, to attend meetings and other functions of the local branch upon payment of such fee as may be determined by the local branch of the Society.

ON ENTERING PHARMACY

There is a great responsibility upon parents and apprentice-masters to ensure that before a boy or a girl takes any steps towards entering Pharmacy, he or she is thoroughly familiar with the latest regulations governing the Society's Examinations.

The apprentice-master, or failing him the parents, or failing them the apprentice himself should write to the Registrar, 17, Bloomsbury Square, London, W.C.1, for a copy of the Regulations affecting the Examinations of the Pharmaceutical Society and the Curriculum and training connected therewith.

The Apprentice-Master

Before accepting a boy or girl as a pupil the apprentice-master must satisfy himself, preferably by enquiry from the Registrar, that the prospective pupil has been registered as an "Apprentice or Student." Having obtained this information and decided to accept the boy or girl as a pupil the apprentice-master must enter into "Articles of Pupilage" with the pupil and the parents or guardian (see note on p. 8 on Period of Pupilage). The articles must contain the provisions set out in the draft articles contained in the Appendix to the Examination Regulations. A set of Articles comprising one stamped copy and two unstamped copies which satisfy the requirements of the Examination Regulations may be obtained, price 3s. 6d. the set, from the Registrar of the Pharmaceutical Society. After these forms have been completed the stamped copy and one of the unstamped copies must be sent to the Registrar for endorsement. The stamped copy is returned and is usually retained by the employer; the unstamped copy is retained by the Registrar. The second unstamped copy of the articles is held by the pupil during his

PHARMACEUTICAL POCKET BOOK

period of Pupilage. At the completion of the period of Pupilage the apprentice-master must complete the form of Discharge attached to the stamped copy which then becomes the property of the pupil.

The Parent

When considering Pharmacy as a future for his son or daughter the parent, unless he be a pharmacist himself, may decide to discuss the prospects of the future of Pharmacy with a pharmacist known to him. Such a course may be very useful but the parent would be well advised to obtain from the Registrar of the Pharmaceutical Society a copy of "Some Notes on Pharmacy as a Career," price 1s. 1d. post free. This publication not only contains an indication of the prospects in Pharmacy, but also a useful summary of the expenditure for which provision must be made in the case of a boy or girl adopting Pharmacy as a career. In addition the booklet contains a review of the Examinations of the Pharmaceutical Society.

Parents wishing to have advice upon the Examination Regulations or the career of Pharmacy may consult the Registrar, preferably by appointment.

The Pupil

In his own interests the young person adopting Pharmacy as a career should make it his business to ensure that both the apprentice-master and the parent have adopted the suggestions indicated above and if any one of the suggestions has not been carried out he cannot be too strongly urged to communicate with the Registrar of the Pharmaceutical Society. The pupil, at the outset of his career, should make it his own personal responsibility to familiarise himself with the Scholarships and Prizes which are available annually for competition. Reference to these Scholarships and Prizes is made on page 4. Steady and continuous preparation for any of the Scholarships will be advantageous to the pupil and even though he fail to secure a scholarship he will appreciate the knowledge he has acquired.

Period of Pupilage

It should be realised that a period of pupilage is served not only to satisfy the examination regulations in regard to training in the dispensing and compounding of medicines but also to provide an insight into the business side of Pharmacy including stock-keeping and stock-taking, ordering, a knowledge of prices and the keeping of accounts. The Society's Qualifying Examinations do not include an examination in business procedure, and for this reason the Examination Regulations require that a person must receive under articles of pupilage 4,000 hours' practical course of study in accordance with specified rules. Obviously, however, a pupil will need to devote a certain part of his pupilage to learning the business side of pharmacy, and it is usual for the pupilage to extend over a period of three years.

The Student's Library

The student will be well advised to read as widely as time permits. During attendance at courses of instruction, the books to read will be of

two kinds, those for routine study and those of a larger or more special-kind to which it will be found helpful to refer from time to time. For the names of suitable books, the student will naturally consult his teachers.

The scope of reading during apprenticeship, and for special purposes such as scholarships, is not so clear since the reading will not be based on any definite course of study and will depend to some extent upon the circumstances of the particular student.

Should any difficulty be experienced in the choice of books at any stage in the student's career, or guidance be needed upon a course of reading after qualification, the Registrar of the Society will be glad to advise.

Examinations and Courses of Study

Having passed an examination in general education of the standard necessary to enable him to commence his pharmaceutical studies and after registering as an "Apprentice or Student" with the Society, a student has three distinct periods of study to undergo. These are (i) a course of study occupying one academic year in preparation for the Intermediate Examination, (ii) a course of study occupying one academic year for the Chemist and Druggist Qualifying Examination, or two academic years for the Pharmaceutical Chemist Qualifying Examination, and (iii) a period of pupillage in a pharmacy, hospital dispensary, or manufacturing pharmaceutical laboratory, under conditions approved by the Council of the Society.

The standard of the Intermediate Examination is approximately that of a University Intermediate Examination in Science. The subjects are Biology, Chemistry and Physics, and the course may be taken only at an institution approved for the purpose by the Council of the Society. Exemption from the examination may be obtained by a student who has been awarded a certificate of having passed an approved University Intermediate Examination or Higher School Certificate Examination of England or Wales if, in order to obtain such certificate, he passed in Chemistry, Physics and either Biology or both Botany and Zoology if taken as separate subjects. In the case of the Higher School Certificate Examination the above subjects must be passed as principal subjects.

It is recommended that whenever possible a student should remain at school until he has obtained one of the above certificates and thereby qualified for exemption from the Intermediate Examination, for by adopting this procedure the student is not only able to satisfy the Society's Intermediate Examination regulations without further examination, but he will also be in possession of a certificate which will be of value to him if he decides at any time to read for a University degree.

After satisfying the regulations for the Intermediate Examination either by passing that examination itself or by passing an examination accepted in its place, the student, if he has not already done so, should decide whether he wishes to obtain the original and higher qualification of Pharmaceutical Chemist, or whether he will at the outset, at all events, be content with the qualification of Chemist and Druggist. It is fitting, therefore, at this stage to mention that those holding the higher qualification

are in an advantageous position when applying for almost all the more important and more remunerative appointments in pharmacy.

There are several roads which a student may choose in order to obtain the Pharmaceutical Chemist qualification. If he has passed an examination entitling him to commence a course for a University degree in pharmacy approved by the Society and has passed the appropriate intermediate examination of that University, the student is advised to take the degree course, which normally occupies two academic years. On being granted his degree, he will then apply for admission to the Pharmaceutical Chemist Qualifying Examination and be examined only in Forensic Pharmacy. When he has passed the examination in this subject and completed the necessary period of pupillage, he will be eligible for registration as a Pharmaceutical Chemist. A candidate may enter for the Pharmaceutical Chemist Qualifying Examination and satisfy the examiners in Forensic Pharmacy at any age, and if preferred without having undergone a practical course of study under articles of pupillage, but he will not receive a certificate entitling him to registration as a Pharmaceutical Chemist until he has attained the full age of 21 and has submitted a declaration in the prescribed form that he has undergone the practical course of study under conditions approved by the Society. An alternative approach to this examination is, after satisfying the Intermediate Examination requirements, to attend at a recognised institution a course occupying two academic years, and to take the examination direct instead of obtaining exemption from the greater part of it through an approved degree in pharmacy. At the end of the first of these two years, the student, if he obtains the necessary certificate from the institution, may enter for the examination in Forensic Pharmacy and that section of Pharmaceutics which relates to the translation and dispensing of prescriptions. If successful he will not then be required to take these subjects in the Pharmaceutical Chemist Qualifying Examination at the end of the final year. If the student has already completed the prescribed period under articles of pupillage he may enter for the Chemist and Druggist Qualifying Examination at the end of the first year and secure the same exemption. As in the case of the candidate for the Pharmaceutical Chemist Qualifying Examination who has previously been granted an approved degree in Pharmacy, the candidate who enters for and passes all subjects will not receive a certificate until he reaches the full age of 21 and completes the required period of pupillage. In the same way also this practical period of pupillage may be taken either before or after entering for the examination but must be completed under articles of pupillage if undergone prior to entering for the examination.

A third means by which this qualification may be obtained is to pass the Chemist and Druggist Qualifying Examination, the course for which occupies one academic year at a recognised institution, and subsequently to attend the second year of the two-year course of instruction for the Pharmaceutical Chemist Qualifying Examination. Before a student can enter for the Chemist and Druggist Qualifying Examination, he must have completed the necessary period of pupillage.

The relationship between the Society's examinations and approved degrees in pharmacy is demonstrated in the chart on the following page.

EXAMINATION CHART

Student intending to take an Approved* Degree in Pharmacy

Obtain a certificate of general education which entitles the holder to study for a degree in pharmacy at the University chosen (see that University's Regulations).

Register as a Student of the University

Attend a full-time day course of instruction in accordance with the University Regulations (in the Universities of London and Manchester this course occupies three years).

If the exempting examination is of University standard the student may proceed to the Degree course which will occupy two years.

Degree Examination in Pharmacy

(This does not entitle the holder to practise or to registration as a pharmacist, but the degree exempts the holder from examination in all subjects in the pharmaceutical Chemist Qualifying Examination with the exception of Forensic Pharmacy.)

Student not intending to take an Approved* Degree in Pharmacy

Obtain a certificate of general education (this certificate must include a pass in mathematics) which entitles the holder to study for a degree at any University in Great Britain.

Register as an "Apprentice or Student" of The Pharmaceutical Society of Great Britain.

One year full-time day course of instruction at a recognised institution.

Intermediate Examination (see Reg. 8 for examination exemptions)

Two years full-time day course of instruction at a recognised institution.

One year full-time day course of instruction at a recognised institution.

Chemist and Druggist

Qualifying Examination
(Before this examination is passed the student must undergo a practical course of study† in a shop or approved* hospital dispensary or manufacturing pharmaceutical laboratory of at least 4000 hours under conditions approved by the Council of the Society.)

One-year full-time day course of instruction at a recognised institution.

Pharmaceutical Chemist

Qualifying Examination

(Either before or after this examination is passed, the student must undergo a practical course of study† in a shop, or approved* hospital dispensary or manufacturing pharmaceutical laboratory of at least 4000 hours under conditions approved by the Council of the Society.)

†For most students the practical course of study is represented by apprenticeship.

*Approved by the Council of The Pharmaceutical Society.

THE SCIENCE AND ART OF PHARMACY

Whilst there is evidence to suggest that the preparation of medicaments for the cure or alleviation of disease was carried on very early in human history, the emergence of pharmacy as an art may be considered to date from the Græco-Roman period. The word pharmacy is derived from the Greek *pharmakon*, a drug, and the practice of curative medicine is intimately connected with Galen from whose name is derived the modern word "galenical".

The development of pharmacy as a science depended upon a more exact knowledge of plant constituents, and a deeper understanding of the biological sciences. It is not surprising, therefore, that pharmacy was not established on a scientific basis until the middle of the last century, when the developing chemical industry was placing new materials at the disposal of physicians and increasing knowledge of biology was stimulating the demand for more rational medicaments.

The publication of pharmacopœias, books containing descriptions of drugs and directions for making preparations from them, was commenced in 1618 with the first London Pharmacopœia, but it was not until 1864 that the first British Pharmacopœia was published. It was the *B.P.* of 1898 which first provided standards for the alkaloidal strengths of galenicals prepared from crude drugs. Previous preparations of this type were bound to vary in strength owing to the variation of the active principles of the crude drugs, but it was now possible to produce standardised preparations, thus establishing the practice of pharmacy on a scientific basis. The first *B.P.C.* was published in 1907 to answer the demand for a publication having the authority of some statutory body. It was intended to supplement the *B.P.* by providing information of substances which, although in constant demand, had ceased to receive pharmacopœial recognition and to introduce newer preparations and medicaments which had not yet become established remedies in the pharmacopœia.

More recent developments in synthetic chemistry have resulted in the elucidation of the chemical structure of naturally occurring substances and their synthesis. The study of chemotherapy has produced synthetic substitutes for naturally occurring alkaloids, hormones and vitamins. Thus pharmacy now has at its disposal, in addition to scientifically standardised galenicals, a vast number of pure chemical substances possessing specific physiological actions. The scientific nature of modern pharmacy is reflected in the *B.P.* 1932 and its six addenda and in the scientific publications of the Pharmaceutical Society which include the *B.P.C.* 1934 and its six Supplements and the Extra Pharmacopœia.

This broad expansion in the field of pharmaceutical activities has naturally opened up many new avenues to the pharmacist and possession

of the statutory qualifications of the Pharmaceutical Society now entails a wide knowledge of a variety of subjects. The principal social function of the pharmacist is to supply carefully standardised medicaments for the treatment of disease. This function may be performed in a variety of ways and the practice of pharmacy is by no means restricted to the retail field.

The retail pharmacist, by keeping open shop, supplies to the public dispensed medicines, pharmaceutical materials for domestic use, and such poisons as may be supplied legally. In addition, he has to be equipped to give personal advice to the public and to discuss with the medical profession the new preparations which are constantly coming into use.

The student may, however, wish to specialise in other directions. In manufacturing pharmacy, the pharmacist has the opportunity of making pharmaceutical preparations on a large scale and this will entail specialisation in a particular branch of pharmaceutical production. The range of substances used in pharmacy includes galenicals, inorganic and organic chemicals, crude vegetable and animal drugs, biological products and sterile preparations for parenteral administration. In the handling and production of these, the pharmacist may find it necessary to supplement his qualifications with a degree in science.

There is a position, also, for the pharmacist in the field of analytical chemistry. In this sphere there are two main avenues which may attract the pharmacist. He may be engaged in analytical chemistry in the laboratories of a firm of manufacturing chemists or he may become a private consultant or a public analyst under the Food and Drugs Act. The sound knowledge of all kinds of substances gained by the student of pharmacy will prove a useful foundation on which to build the training and qualifications necessary for the practice of analytical chemistry.

In hospital pharmacy, the pharmacist may specialise in the production of sterile medicaments, or he may find his vocation as an administrator and buyer of the pharmaceutical department of a large hospital. In addition, the practice of hospital pharmacy requires a sound knowledge of therapeutics.

Pharmaceutical research may be undertaken in the various branches of science affecting pharmacy. After specialisation and additional study, the pharmacist may undertake research in organic chemistry, bacteriology, biochemistry, pharmacognosy, pharmacology or pharmaceuticals.

The foregoing paragraphs have outlined a few examples of the variety of channels open to the pharmacist. Modern therapeutics makes use of an extremely wide range of medicinal agents to which additions are constantly being made, and pharmacy, which has been described as the handmaid of medicine, is increasingly required to act as its guide. The practice of pharmacy is constantly expanding with the general development of science and in the future will yield more and more in interest and variety to the student.

Although now well established on a scientific basis, pharmacy remains also an art. The modern pharmacist aims at applying the results of

modern science to the traditional craftsmanship gained from the practice of pharmacy as an art for many centuries. In modern terminology, pharmaceutical endeavour is directed towards the production of elegant preparations, the therapeutic value of which is assessed on sound scientific principles. It is hoped that by indicating correct method and by supplying helpful data, the pages which follow will assist the student and the practising pharmacist to achieve this end.

DISPENSING

Adequate knowledge of dispensing cannot be gained merely from an acquaintance with an arbitrary set of rules dealing with the various difficulties that occur. The aim of dispensing is to ensure that every dose contains a uniform proportion of each of the ingredients; that the activity of one drug is not diminished by improper mixing with another of a different nature; that a soluble substance is not rendered practically insoluble by being massed into a pill or tablet, for instance, by the aid of something that will hinder its dissolution; and that the medicine is presented to the patient in the most pleasing and palatable form consistent with its nature. As should readily be appreciated, dispensing must be based on a sound knowledge of chemistry, physics and other sciences. The general nature of chemical action and of the chemical substances in use in medicine must be known, and the conditions favourable to reaction occurring between two or more of them; while some familiarity with the principles of solution and the general effects of heat on substances, the nature of tinctures, extracts and other galenical preparations, and of resins, alkaloids and other active principles will be required. In the present articles emphasis will be laid on the principles involved in the methods described. It is only by proceeding on these lines that a dispenser can become competent to deal with new difficulties, such as may be presented by a combination differing from any he has previously encountered.

Prescription Latin and Dosage. It is hardly necessary to remark that, as prescriptions are partly written in Latin, some degree of familiarity with this language is necessary for their correct interpretation. There are several excellent text-books dealing with pharmaceutical Latin, and since it would cause some interruption of the chief subject-matter of these articles if we were to discuss the language of the prescriptions given as examples, we shall not deal with this subsidiary portion of dispensing at present, but students can obtain useful practice in expanding the abbreviated wording of the prescriptions into full Latin and then translating it into literal English. Similarly, a familiarity with the correct doses of the drugs and preparations employed is necessary to a competent dispenser, in order that he may detect any error that might be dangerous in the quantities ordered, and the student should carefully study the table of doses on pages 121-132.

GENERAL PRINCIPLES

Discipline is essential for accurate dispensing and once the dispensing of a prescription has been commenced, the attention given it should be

undivided and concentrated. The pharmacist who understands the routine of dispensing and the danger of mistakes that can arise will insist upon a rigid routine. The dispenser who engages in conversation whilst dispensing runs a very grave risk of making mistakes, and talking or any interruption of the dispenser whilst dispensing should be strictly minimised. Accuracy and cleanliness should be cultivated first, speed will follow later. Accuracy can only be attained by a proper understanding of the apparatus used, such as the balance, weights and measures, and a good appreciation of how errors may be introduced. Neatness and cleanliness must be assiduously cultivated.

The following are a few points to be observed by a dispenser:—

(1) Always keep the bench neat and tidy particularly during the actual dispensing. Methodically remove used apparatus, spatulas, etc., as they are finished with.

(2) Do not throw used paper, string, etc., on the floor, nor allow it to accumulate on the counter.

(3) Apply a clean duster frequently to the bench.

(4) When an ingredient has been weighed or measured replace the bottle on its shelf immediately. Never have a collection of bottles on the counter. This may lead to serious mistakes.

(5) Always have the weight or measure of a potent ingredient checked.

The Label. The label should be written in ink and never blotted but allowed to dry, since this gives a much clearer writing. It should be written before commencing to dispense the prescription so that when it is placed upon the package it can then be rechecked—the mind having been switched away from the writing to the actual dispensing, so that in the rechecking there is less chance of making an error than if the label were to be written after dispensing and placed upon the package immediately.

The Balance. The balance is, of course, a very essential part of the dispenser's equipment and should be thoroughly understood. A poor operator using bad manipulation will not only weigh inaccurately but he may very quickly decrease the accuracy of his balance by heavy usage. The types of balance used in a dispensary will vary. Balances are graded according to their accuracy. Class A balances are required to turn to $\frac{1}{10}$ grain. These are the usual type of fine balance used in a chemistry laboratory, and in a dispensary are usually only used for potent medicaments such as atropine sulphate, etc. The usual type of dispensing balance belongs to Class B and is required to turn to $\frac{1}{2}$ grain. They are more robust than Class A. The Class B dispensing balance is provided with one movable glass or stainless steel pan which should be opposite the dispenser's right hand and on which the substance to be weighed should be placed, the weights having previously been put on the opposite pan. It should be noted here that the weights should be placed on the left scale pan before the medicament is placed on the right-hand pan. This is often reversed when working in practical chemistry where the weight of a substance has to be ascertained; but here it will again be seen that the adjustable side is the right-hand side, the weights in this case having to be adjusted whilst the substance remains constant. Should the dispenser have to weigh in similar circumstances to those used in the chemistry

laboratory he should remember to follow the usual rules—the adjustable material on the right-hand side.

The Class B balance should never be used for weighing very small quantities, as its accuracy is not sufficiently great. A sound rule to apply is this:—Never weigh less than one grain or 0.05 grammes of any potent substance and always weigh these quantities on a Class A balance. Substances such as atropine sulphate, adrenaline, arsenic trioxide and strychnine hydrochloride should be weighed in this way. The student should appreciate the importance of being very accurate in weighing when dealing with toxic substances. The following are general rules applying to the use of a balance:—

- (a) Always check the accuracy of the balance by giving it a trial swing before dispensing so as to make certain that it is not out of adjustment, or sticking.
- (b) Keep the scale drawer closed, otherwise it soon accumulates a collection of medicaments that have been used on the balance. Moreover, these substances may come into contact with the weights and make them inaccurate.
- (c) Always wipe the pan immediately after each weighing, and never on any account weigh a second ingredient on top of the remains of the first. This is to prevent contamination of the dispenser's stock, since if any surplus of the second substance on the scale pan has to be returned to the stock bottle, the contents may be contaminated with some of the first substance removed from the pan at the same time. Moreover, although the pan be made of stainless steel there are certain substances which will corrode it if left in contact with it for any length of time. This particularly applies to chlorinated lime, mercuric chloride and iodine.
- (d) Never tap the pan on the sides of the mortar when removing the contents. This really only applies to a glass pan which is liable to become chipped, and the accuracy of the balance suffer in consequence. This rule is not of much importance with a metal pan, but if the dispenser gets the habit of tapping the pan on the mortar he may do it unconsciously with a glass pan. The pan may be tapped on the wooden handle of a pestle.
- (e) Soft extracts and sticky substances are usually weighed on a piece of parchment paper on the pan.

The Measure. Pharmaceutical measures are of two main types. There is the old-fashioned conical measure peculiar to pharmacy, and there is the cylindrical measure similar in type to that used in practical chemistry. Both types have their advantages and disadvantages, *e.g.*, the conical-shaped measure is easy to clean whilst the cylindrical measure is difficult. On the other hand, the meniscus of the conical measure is a very wide one in comparison with that of the cylindrical measure. Consequently, the same person reading the same volume of liquid in the two types of measures and making the same personal error in judging the level of the meniscus will have a much greater error in the case of the conical measure than in the case of the cylindrical measure. That is why for very exact measurements the meniscus is reduced as much as possible, as in the pipette. Pipettes should be used

in pharmacy for measuring quantities of 1 millilitre or less. The following rules should apply to the use of measures:—

- (a) Always hold the measure perpendicularly and at a level such that the eye and the meniscus lie in a horizontal line. This is extremely important, for if the measure is held below the eye level, or if it is tilted, it is impossible to measure accurately. The beginner should be very careful to train himself in respect to this particular item; it is so easy to detect an inaccurate dispenser by the manner in which he holds his measure. Neglect of this rule is a very common cause of inaccuracy in dispensing.
- (b) The measure should be held in the left hand and the bottle in the right hand. The bottle should be grasped in such a way that the stopper can be removed by the hand that is holding the measure. The stopper should never be put down on the dispensing bench, as it is liable to pick up substances on the bench and so transfer them to the bottle. The bottle should be held in such a way that the contents are poured away from the label so that, should any liquid run down the side of the bottle, it will not run over the label and disfigure it. The good dispenser will prevent liquid from running down the side of the bottle by gently tipping the lip of the bottle against the measure after measuring.
- (c) In dispensing the prescription it often happens that liquids of different viscosities have to be measured. Never measure a thin liquid in a measure that has been used for measuring a thick liquid, such as glycerin, without having washed out all the latter. Neglect of this precaution will result in obtaining a smaller volume of the thin liquid than that required.
- (d) Always choose a suitable-sized measure for the particular quantity required. Do not attempt to measure 1 fl. oz. in a 10 fl. oz. measure or 1 fl. drachm in a 4 fl. oz. measure. When quantities of 10 minims or less are required, and particularly if the liquid is very volatile, such as dilute hydrocyanic acid, it is advisable to use a graduated pipette fitted with a rubber teat (like a fountain pen filler). It should be remembered that the minim and the drop are not equal. As the size of drops of various liquids will vary a measure should always be used.

Mortar and Pestle. A well-equipped dispensary will always have a good selection of pestles and mortars; not only a variation in size to cope with different quantities to be manipulated but a variation in design for special purposes. The student will find that there is much to learn in choosing the right type of pestle and mortar and in manipulating the pestle in the correct manner for a particular operation. The following types of mortars are in use:—

GLASS MORTARS. These are usually quite small and are very useful for manipulating small quantities of toxic substances such as atropine sulphate when it is necessary to dilute them with a diluent such as lactose. Glass is also very useful when medicaments such as iodine have to be powdered, since it is not stained.

PORCELAIN COMPOSITION OR WEDGWOOD MORTARS. This is the usual type of mortar and the material varies greatly in quality. It is

occasionally made in glazed porcelain but this is rarely satisfactory, as the surface so quickly scratches. It is usually made of earthenware and may have a perfectly smooth surface or it may have quite a rough surface. The roughened surface mortar has a particular value when fibrous drugs have to be ground down to powder. The drug is gripped between the mortar and the pestle and more readily reduced to a powder. The roughened surface mortar, however, is readily stained, and is rarely used for purposes other than the one mentioned. The smooth surface mortar is the one that will be most used on the dispensary counter for light grinding, for emulsifying, for mixing, for levigation, and for the preparation of ointments, etc.

THE METAL MORTAR. This is usually made of bell metal or, occasionally, of brass and is valuable when drugs have to be bruised such as clove, buchu, etc. The mortar should not be made of iron, as this will sooner or later cause trouble by reacting with the medicament. Porcelain or Wedgwood mortars should never be used for pounding drugs, as they are liable to break.

PESTLES. The shape of the pestle is a very important consideration. It may be rounded or flattened, both having their particular uses. Rounded pestles will make only point contact with the mortar and when it is moved in the mortar will act merely as a stirrer. It should not be used for grinding or the preparation of emulsions. A flat-headed pestle will make a good area contact with the mortar and thus give good shearing action, so that ingredients caught between it and the mortar are thoroughly levigated. The accurate fitting of the flat-headed pestle for a mortar is an extremely important factor in the preparation of emulsions, ointments, or in the preparation of a very fine powder from large particles. The student should also realise that there are correct methods of holding the pestle in order to obtain the best results in particular cases such as the following:—

- (i) The pestle may be grasped one-third of the way down and moved round the mortar with pressure in an anti-clockwise manner. This gives a grinding and levigating action.
- (ii) If it is only necessary to mix or emulsify then the pestle may be lightly grasped towards the end and swung round by a movement from the wrist. This action should always be used in the preparation of emulsions and never the grinding or levigating action.
- (iii) The end of the pestle may be grasped in the palm of the hand and heavy pressure applied with a lever action against the side of the mortar. This action is used in the massing of pills when a heavy pressure has to be used and when it is often advisable to generate a certain quantity of heat by friction.
- (iv) Pounding is effected with the pestle grasped as for levigating and grinding. The student must appreciate all these four actions and must apply them if he is to obtain the maximum value from the pestle and mortar.

MEDICINES IN LIQUID FORM

The number of different forms in which medicinal combinations may be prepared for administration is very much greater at present than in former times, and tends still to increase. But in a very large proportion

of the prescriptions with which the pharmacist deals the medicine is ordered either as a liquid or a mixture of solid and liquid, in which the latter predominates. This preference shown by prescribers for the liquid form is doubtless partly due to custom, but it is certainly largely due to well-marked advantages of this form, as well as to the fact that many drugs are themselves liquids, and cannot be administered in any other way. It will be well to mention briefly the special considerations which lead to liquid combinations being ordered, as it is of fundamental importance that the compounding should be done in such a way that all the advantages of the liquid form may be obtained.

In the majority of cases, in order that a drug which is taken internally may exert its therapeutic effect, it is necessary for it to be admixed with one or more of the fluids of the body, either the digestive juices of the stomach or intestines, the blood, or the special secretions of particular organs. If, then, the drug is already in solution in a liquid when taken into the body, it will pass more readily and rapidly into the fluids which it there meets than if it were in the solid state; a dissolved salt, for instance, taken into the stomach, will more readily pass into the circulation than if the same salt were swallowed as a solid, requiring to be dissolved in the liquid contents of the stomach before absorption by the blood could begin. Generally, then, ready absorption and prompt exercise of activity are desiderata which lead to the liquid form of medicine being prescribed; but other considerations are sometimes also of importance. The insoluble bismuth salts, for example, are sometimes required to exercise a mechanical action in the stomach and intestines, forming a protective layer on the walls, and uniform distribution of such substances is better secured if they are already distributed evenly in a liquid before administration. In the case of a gargle or paint for the throat, or a rectal injection, proper application of the drug would be practically impossible without a liquid vehicle, and the same applies to liniments and lotions for external use.

The two chief aims of the dispenser in preparing medicines in the liquid form must be, first, to ensure that every ingredient shall be in such a condition that its full activity is unimpaired, or if its activity is necessarily lessened by some other ingredient ordered with it, that such diminution of activity shall be the least possible; and, second, to secure a perfectly even distribution of each ingredient throughout the whole of the medicine, so that each dose shall contain the same proportion of the various constituents. The securing of these two objects is often not a perfectly simple matter, and the methods required in typical cases will have to be studied. It is important that the objects should be kept in mind, since they furnish the key to the methods to be used.

Lotions, liniments, and other liquid medicines for external or local application are for the most part prepared in the same way as those to be taken internally, and the points in which they differ will be best considered afterwards. We shall commence with "mixtures," by which name are designated medicines for internal use when consisting of more than one dose, and taken in not very small quantity. A single dose ordered by itself is known as a "draught," while concentrated mixtures to be taken in very small doses are termed "drops." The methods of dispensing required in these cases are generally the same as for mixtures, and we shall for the most part deal with them together.

MIXTURES

When a mixture consists solely of liquid ingredients which do not in any way decompose or combine with each other, very little is required beyond accurately measuring them and putting them into the bottle together with the vehicle. The following is an example of such a simple case:—

R	Liq. Ammon. Acet. Dil.	3 vi.
	Tinct. Aurant.	3 iii.
	Sp. Ammon. Aromat.	3 ii.
	Syr.	3 ss.
	Aq.	3 vi.

Even here, however, the order in which the ingredients are mixed is not without importance. The spirit of sal volatile should in this case be added after diluting the other preparations with most of the water. By doing so the loss of ammonia while filling up the bottle, and the darkening caused by its action on the colouring matter of the orange, are reduced to a minimum.

R	Liq. Bism. et Ammon. Cit.	3 ss.
	Tinct. Cardam. Co.	3 ii.
	Tinct. Gent. Co.	3 ii.
	Acid. Hydrocyan. Dil.	℥ xx.
	Aq. Ment. Pip.	3 viii.

In this case the hydrocyanic acid must be added last, or there will be a very serious loss while filling up with the peppermint water. Mixtures containing hydrocyanic acid must always have a "Shake the Bottle" label attached. Vapour of hydrocyanic acid collects in the space above the liquid (especially when the bottle is partly emptied), and the shaking re-dissolves this and distributes it evenly among the doses. Some dispensers make a rule of putting a "shake" label on every mixture dispensed, whatever it is; and, although this is not necessary, it is better to direct shaking when not required than to omit such direction when it ought to be given.

Solids in Mixtures. If one of the ingredients in a mixture is a solid which is readily soluble in the vehicle, the case is scarcely less simple than the preceding. In the following example:—

R	Pot. Brom.	3 ii.
	Tinct. Nuc. Vom.	3 vi.
	Syr. Limon.	3 vi.
	Aq.	ad 3 vi.

the bromide is easily soluble in a part of the water, and the dispenser has then only to mix liquids. There are, however, several points to be noted.

The usual rule when a solid is to be dissolved is to powder it in a mortar (preferably of glass), dissolve in part of the vehicle, and then strain the solution (if any foreign particles are visible in it, as often happens) through fine muslin or cotton wool into the bottle. In dealing with a salt like potassium bromide, which is very easily soluble, is usually quite clean, and is in large crystals from which any foreign particles can be readily removed, there is no objection to putting it straight into the bottle with some of the water, corking and shaking up till dissolved; but many soluble salts, if so treated, would cling about the neck of the bottle, probably some being lost, and it is on the whole better to keep to the rule of dissolving before putting into the bottle. When it is necessary to

shake up the bottle in the process of making a mixture it should always be corked and not merely closed with the finger. Many of the commoner soluble salts are sometimes kept in solution, and in that case, instead of weighing out the amount of the solid ordered, the corresponding amount of solution is measured. There is no objection to this plan provided it is kept within its proper limits; thus only those salts should be so dealt with which are quite stable in solution, salts of organic acids being generally unsuitable on account of the tendency of their solutions to develop growths of a fungous nature, while some salts, such as the official ferrous sulphate, undergo rapid oxidation or decomposition in solution. The usefulness of aqueous solutions is further limited by the fact that they can only be employed in a prescription in which the vehicle is plain water, and are not applicable in all those cases where a medicated water or an infusion is the solvent ordered (unless concentrated infusions or concentrated waters are employed). It is, of course, essential, if stock solutions are used, that they should be prepared accurately, and it is necessary to be on guard against errors arising from confusion of grain-measures (sometimes called fluid grains) and minims (*see Dispensing Solutions*, p. 77). A solution of potassium bromide, for example, may be conveniently made to contain 60 grains in 4 fluid drachms.

Soluble Salts in Excess. When a soluble salt is ordered in a prescription, but in larger quantity than will dissolve in the amount of vehicle available, the case is not quite so simple. In most instances the degree of solubility of a solid in a liquid is largely affected by temperature and, as a rule, the solubility is greater at a higher temperature than at a lower; it might be suggested, therefore, that the excess of the salt should be brought into solution by heating the vehicle, or heating the two together until solution is complete. Thus in the following lotion:—

R. Acid. Boric.	℥iii.
Sod. Chlorid.	℥ii.
Aq. Dist.	ad ℥vi.

the boric acid all dissolves if the mixture is heated to about 45°. When the liquid has become quite cold again, the excess of boric acid is no longer held in solution but crystallises out. This may not occur for some time since a solution will often remain supersaturated when undisturbed, but crystallisation may take place later. The dispenser must not only consider changes that may occur in the course of compounding, he must also accustom himself to foresee reactions that may take place only after an interval, and make provision against them. In the present instance the proper plan is to rub the boric acid and sodium chloride to fine powder in a mortar, add the distilled water, and dissolve as much as possible by triturating and shaking, the excess remaining as a sediment in the bottle, which must bear a "shake" label. If, on the other hand, heat is employed, the excess of boric acid is deposited as crystals, which, on account of their form and their adherence to the glass, cannot be evenly distributed through the liquid by shaking.

Other effects of heat must also be taken into consideration. In the mixture here ordered:—

R. Sod. Bicarb.	℥vi.
Tinct. Gent. Co.	℥ii.
Syr.	ss.
Aq.	ad ℥vi.

the sodium bicarbonate will not all dissolve in 5½ fl. oz. of cold water, but if it is boiled with the water for a few minutes it not only dissolves but none of it is deposited on cooling. Such a use of heat, however, is not permissible because solution of sodium bicarbonate is decomposed by boiling, carbon dioxide escaping, and the carbonate remaining in the liquid. The excess of bicarbonate is not deposited because the salt has been almost completely converted to carbonate, which is quite contrary to the prescriber's intention.

The Application of Heat. The application of heat is necessary in preparing some other forms of medicine, but in the dispensing of mixtures the cases in which it should be used are extremely rare. The general rules must be, of course, that heat is not to be used to produce a change (*e.g.*, increased solubility), which will be reversed on again cooling; and, on the other hand, it must not be employed when it produces a permanent change and results in the administration to the patient of a different chemical substance from that ordered by the prescriber. If it is desirable to save time by using hot water to dissolve a slowly soluble salt, or to employ heat in any other way, the dispenser must first satisfy himself that neither of these conditions applies.

The following mixture illustrates the points which have been raised in the above discussion:—

R Pot. Chlorat.	℥ss.
Syr. Zingib.	℥vi.
Inf. Aurant.	ad ℥vi.

The quantity of chlorate is more than the vehicle will dissolve at the ordinary temperature, and the excess must remain as a sediment in fine powder. If the patient happens to keep a part of the mixture for some time, the powdered sediment is likely to be gradually replaced by crystals, which can no longer be evenly distributed by mixing. The explanation of the change is that the medicine has been exposed to variations, either large or small, of temperature; when the temperature rises, a little more chlorate goes into solution, and when it falls, the excess is deposited in crystalline form; at the next rise of temperature, more of the powder, not the newly-formed crystals, will dissolve, to be in turn deposited, and by the continuance of this alternating process the powder is gradually completely replaced by crystals.

The last prescription, in which the vehicle is an infusion, raises the question of whether infusions should be freshly prepared or whether a dilution of a concentrated infusion should be used. The 1932 Pharmacopœia recognises both types of infusion, and the dispenser is at liberty to use either the fresh infusion or the diluted concentrated infusion unless the prescriber definitely describes the infusion as "*recens.*"

It should be borne in mind that the concentrated infusions contain from 20 to 25 per cent. of alcohol, and thus the dilution will contain 2½ to 3 per cent. This may affect the solubility of certain ingredients of the mixture.

Another matter to be mentioned is that some dispensers are apt to overlook the significance of the word "*ad*" in the prescription, and to add a quantity of concentrated infusion corresponding to the total volume of the mixture instead of to the volume of infusion that would be required if the prescription were dispensed exactly as written. Thus, in the above

example, if the usual "1 to 7" concentrated infusion is employed, the quantity to be taken is as nearly as possible 5 fl. drachms (the chlorate being taken to occupy half the volume of an equal weight of water), and not 6, as sometimes erroneously dispensed. Similar rules apply to the use of concentrated waters which are now also officially recognised.

Insoluble Salts in Mixtures. Mixtures containing salts insoluble in the vehicle ordered are treated in much the same way as those containing soluble salts present in excess of their solubility. The following is a common example:—

R	Mag. Carb.	℥ii.
	Mag. Sulph.	℥ss.
	Tinct. Rhei.	℥i.
	Syr. Zingib.	℥vi.
	Aq. Menth. Pip.	ad ℥vi.

The magnesium sulphate is soluble, the carbonate insoluble; the latter must be rubbed down in a mortar with the syrup of ginger and some of the peppermint water, then transferred to the bottle, and the mortar rinsed with further small quantities of the water; the magnesium sulphate is dissolved as already described, and the tincture of rhubarb added nearly at the end, the measure used for the latter being rinsed with the last small quantity of peppermint water; a "shake" label must, of course, be used. In this case the insoluble ingredient is easily diffused evenly by shaking, and, as it only settles slowly, the patient can take a dose before the mixture has again separated. But there are two examples that are not quite so simply dealt with; the first is where the insoluble ingredient is so heavy that it sinks too rapidly for the patient to be able to get the proper proportion in a dose; the second is where an insoluble substance is formed by reaction between two soluble or liquid ingredients of the prescription, when it is very apt to be formed in clots which cannot be evenly diffused by shaking. In both instances special means must be adopted in order that the intentions of the prescriber as to dosage shall not be frustrated.

Precipitation in Mixtures. The methods to be adopted in dealing respectively with heavy insoluble solids, and solids precipitated in the form of clots in the process of dispensing, are not identical though similar in some respects. The following prescriptions present instances of the two methods:—

R	Bism. Carb.	℥iii.
	Tinct. Cardam. Co.	℥ss.
	Acid. Hydrocyan. Dil.	℥ss.
	Aq. Chlorof.	ad ℥vi.

If this is dispensed just as written it will be found that some samples of the bismuth salt settle so quickly after shaking up that an ounce of the mixture poured out into a glass will contain considerably less than the 30 grains which it ought to contain; and, even if the dose is taken directly it is poured out, the quantity of the carbonate actually taken will be further reduced by a portion remaining in the glass.

R	Quinin. Hydrochlor.	gr. vi.
	Sod. Salicyl.	℥ii.
	Ammon. Chlorid.	℥i.
	Tinct. Gelsem.	℥ss.
	Aq.	ad ℥vi.

Double decomposition occurs between the quinine hydrochloride and the sodium salicylate, quinine salicylate being precipitated in the form of a bulky flocculent precipitate.

R Tinct. Tolut.	℥ii.
Tinct. Ipecac.	℥ii.
Syr. Scill.	℥ss.
Aq. Cinnam.	ad ℥iv.

The precipitation which occurs here is not due to chemical action, but to the fact that the tolu balsam which is in solution in the tincture is no longer soluble when the spirit of the latter is diluted with the aqueous medium, and a most unrepresentable mixture results in which much of the tolu adheres to the sides of the bottle.

In these cases the remedy lies partly in increasing the viscosity of the vehicle by a suitable addition. In the first case it is further necessary to have the bismuth carbonate in the finest possible powder; the minute particles, in a somewhat viscous medium, then settle with comparative slowness. Some bismuth salts can be obtained so fine and light that no rubbing down or suspension is necessary. In the other two instances the precipitate must be produced in such a way that the particles are kept from coming into complete contact with each other, so that they cannot coalesce into clots. Many substances—sugar, glycerin, gum, etc.—would increase the viscosity of the vehicle. Gum is by far the most efficient of these; a much smaller quantity is necessary and, as it is itself inert and practically without any effect on the taste of the mixture, its addition is permissible where the addition of sugar, glycerin, or similar substances would not be. Two official gums are available for the purpose—*viz.*, acacia and tragacanth. It is not a matter of indifference which is used, and each is to be preferred on occasion. When the principal requirement is to increase viscosity, as in the first two of the above examples, tragacanth is the more serviceable. Where the function of the gum is chiefly to coat the particles of a precipitate and keep them apart, as in the third example, acacia is the better. Many dispensers use 10 grains of compound tragacanth powder to one fluid ounce of mixture. In case tragacanth itself is used any alcoholic liquid ordered should always be added to it before bringing it into contact with water (compare the official directions for making mucilage of tragacanth); glycerin will do instead of spirit if it is an ingredient of the mixture.

While on the subject of bismuth mixtures, we may notice another point which is raised by the following prescription:—

R Bism. Subnit.	℥ii.
Sod. Bicarb.	℥ii.
Syr. Aurant.	℥ss.
Tinct. Gent. Co.	℥ii.
Aq.	ad ℥viii.

Bismuth subnitrate and sodium bicarbonate mixed together with water slowly react; bismuth subcarbonate and sodium nitrate are formed and half the carbonic acid of the bicarbonate is set free. This reaction proceeds so slowly that if the mixture is dispensed in the ordinary way it is far from complete, and gradual production of carbon dioxide will continue and ultimately lead to the cork being blown out or the bottle bursting, perhaps after it has been received by the patient. Some dispensers recommend using bismuth carbonate in the place of subnitrate,

but this is only permissible if the consent of the prescriber can be obtained; otherwise the proper plan is to hasten the reaction to completion before the medicine is sent out. Rub down the two salts in a mortar and add to them a little hot water, when the reaction will soon be over; then add the Compound Tragacanth Powder, previously rubbed down with the syrup of orange and a little water, and proceed as described above. It will be seen that the hot water is here only used to accelerate a change which is inevitable, and not to produce something different from the mixture ordered by the prescriber.

Double Decomposition in Mixtures. Considering, now, the second prescription given:—

R Quinin. Hydrochlor.	gr. vi.
Sod. Salicyl.	℥ii.
Ammon. Chlorid.	℥i.
Tinct. Gelsem.	℥ss.
Aq.	ad ℥vi.

The method to be adopted is as follows:—Put the tincture of gelsemium into the bottle and shake so that the inside of the latter is thoroughly wetted with it; then add about 9 grains of powdered tragacanth, shake, and quickly add 2 oz. of water and again shake (or an ounce and a half of tragacanth mucilage may be used); dissolve the quinine hydrochloride in half the remainder of the water, add the solution, and shake well; dissolve the sodium salicylate and ammonium chloride in the rest of the water, and add the solution in two or three portions, shaking well after each addition. The precipitate so formed is far more easily diffused by shaking.

Resinous Tinctures in Mixtures. In the following typical prescription, acacia is more suitable than tragacanth:—

R Tinct. Tolut.	℥ii.
Tinct. Ipecac.	℥ii.
Syr. Scill.	℥ss.
Aq. Cinnam.	ad ℥iv.

Dilute the mixed tincture of ipecacuanha and syrup of squill with two ounces of cinnamon water, add half an ounce of mucilage, shake, pour the tincture of tolu in a thin stream into the centre of the mixture, and make up to volume.

In the foregoing and other examples, students should not only follow the directions given, but should also vary them and observe the result. Thus, in the case of the bismuth mixture, trials should be made with different quantities of Pulv. Trag. Co., say, 20, 40, and 60 grains to each drachm of bismuth salt. The effect of other ingredients besides those named, such as are often ordered in similar mixtures, should be tried. It is only by experimenting and proving facts for himself that a dispenser can become competent to deal with the difficulties to be met with in prescriptions which he has not encountered before.

When Suspending Agents are not Needed. It is, of course, by no means the rule that all insoluble substances when ordered in mixtures require the addition of gum or other suspending agent. Some insoluble salts, like light magnesium carbonate, are easily diffused through the mixture by shaking and do not settle again so quickly as seriously to interfere with the proper dose being taken; the same is true of many

vegetable drugs of which the powder is prescribed in mixtures, such as rhubarb. In such instances, however, it is not sufficient to put the powder straight into the bottle and shake with some of the vehicle. Some powders may contain small lumps which require to be broken down, and all are liable to retain some air entangled with the particles, which prevents the latter from being distributed through the liquid. The mixture will then have a film of dry powder floating on the surface, or small bubbles of air coated with powder; in either case the appearance is bad and the doses will not be uniform. The student can easily observe this by shaking up a little Compound Rhubarb Powder in a bottle with water. It should be a rule without exception to rub down an insoluble powder in a mortar, and it is often best to add to it one of the other ingredients before any of the vehicle. In the following example:—

R Pulv. Rhei	℥ii.
Sod. Bicarb.	℥i.
Syr. Zingib.	℥vi.
Aq. Menth. Pip.	ad ℥vi.

Rub the two powders together in a mortar, add the syrup and rub the mixture quite smooth, using a little of the peppermint water if necessary; then add enough of the water, still stirring, to make the mixture thin enough to pour easily, transfer to the bottle and rinse out the mortar with further quantities. In general, it is advisable to add syrup, glycerin or other thick liquid that may be present to the powder which has to be rubbed smooth; in the stiff mixture that results small lumps cannot evade the shearing action of the pestle as they would in a thinner liquid.

R Pulv. Rhei Co.	℥iss.
Tinct. Cardam. Co.	℥ss.
Aq. Chlorof.	ad ℥iij.

Here there is no thick liquid but the tincture is quite suitable to add to the powder. An alcoholic liquid penetrates better than water into a powder containing ginger, the oil and resin of which are soluble in alcohol but not in water; in addition, the much greater mobility of alcohol causes it to break down air-bubbles entangled in the powder, which would not be removed so easily by water.

The Use of Syrup or Glycerin in Mixtures. Syrup and glycerin are often also useful in retarding or even preventing changes which would otherwise occur at once. The order in which the ingredients of a prescription are mixed with the vehicle or with one another has often a very important influence on the result. It is always necessary to consider whether any two ingredients are liable to react with one another and usually the order of mixing is such that the reaction is prevented or retarded as much as possible. The only exception to this rule is provided by cases where it is obvious that the prescriber wishes the change to occur and wants the product of the change. For instance, the following or a similar prescription is sometimes seen:—

R Pot. Bicarb.	℥i.
Acid. Citrici.	℥ii.
Syr. Aurant.	℥ss.
Aq.	ad ℥iv.

Nothing will prevent reaction between the bicarbonate and the citric acid, and it is clearly the doctor's intention that the patient shall have a solution of potassium citrate saturated with carbon dioxide. In this

case the syrup should be added after the reaction has taken place. Hot water should not be employed, since the chief reason for ordering acid and bicarbonate instead of the potassium citrate itself must be that the prescriber wishes the liquid to be saturated with gas, which both improves the taste and has a slight action in the stomach.

The Order of Mixing. The following provide further illustrations of the different results to be obtained by slight differences in the method of mixing:—

B. Sod. Iod.	3iii.
Tinct. Nuc. Vom.	3ii.
Ext. Cinchon. Liq.	3ii.
Glycer.	3iv.
Aq. ....ad	3viii.

If the iodide is dissolved in a little water, the other ingredients added, and the bottle filled up, an unsightly precipitate which cannot be evenly diffused by shaking results from reaction between the iodide and the alkaloids of the cinchona. The best plan is to dissolve the iodide in half the water and add the tincture of nux vomica, mix the liquid extract of cinchona and glycerin and add to them the remainder of the water, and then mix the two liquids. By proceeding in this way the precipitate is in a very finely divided state and can be diffused evenly by a gentle shake.

B. Liq. Ferr. Perchlor.	3i.
Tinct. Digit.	3iss.
Acid. Phosph. Dil.	3iss.
Syr. Zingib.	3ss.
Aq. ....ad	3vi.

If the first four ingredients are put into the bottle without water, or with only a little water, and the latter added afterwards, a very dark mixture results; this is due to the action of the iron on the tannin of the digitalis. If the solution of iron and the acid are diluted with half or two-thirds of the water, and the tincture of digitalis and syrup with the remainder and the two liquids mixed, there is no such darkening.

INCOMPATIBILITY IN PRESCRIPTIONS

This subject is usually discussed under three headings:—

(a) *Therapeutic*.—When the drugs prescribed together have antagonistic effects on the body. This subject does not come within the scope of the present book.

(b) *Physical*.—When the drugs prescribed together are unsuitable for combination on account of their physical properties. One class of cases is when two crystalline organic substances produce a liquid when powdered and mixed together, e.g., camphor and menthol, chloral hydrate and camphor, phenol and camphor. The student should note, however, that similar changes are sometimes intended, for example, the liquid prepared by mixing chloral hydrate and camphor is used as an application.

Another group includes those instances where precipitation occurs from a change in the composition of the vehicle. One of the commonest cases of this is when a salt soluble in water is precipitated by the presence of a large quantity of tincture or other alcoholic liquid; it is then very probable that the precipitate will be in crystalline form, possibly in large crystals. It is necessary to accelerate such an occurrence by dissolving the salt in the least possible quantity of water and adding this

solution to the alcoholic liquids. In this way the precipitate is obtained in a finely divided form, and the mixture may be dispensed with a "shake" label.

A third and much more important group includes those prescriptions in which oils or resins are prescribed in an aqueous medium. Such preparations require the addition of suitable emulsifying agents and careful manipulation. The subject is dealt with fully in the section on emulsions on pages 32-38.

(c) *Chemical*.—When the drugs prescribed together react on one another so as to interfere with the safety, usefulness or elegance of the preparation.

The problems presented by cases of chemical incompatibility are endless, and require great variety in the methods of dealing with them. Only rules of a very general nature can be laid down. It is the duty of the dispenser to interpret as nearly as possible the intentions of the prescriber and where the incompatibility is such that this is not possible, he should communicate with the prescriber. If this cannot be done, it may be necessary to alter the prescription in the same way as if a poisonous dose of a drug were ordered.

It must not be hastily concluded that because two ingredients are chemically or pharmaceutically incompatible that there is an error in prescribing. Such a prescription as the following is sometimes seen:—

R Liq. Ferr. Perchlor.	℥i℥xxx
Syr.	℥ss.
Sp. Ammon. Aromat.	℥ii.
Aq.	ad ℥viii.

Reaction occurs between the alkali and the iron, and ferric hydroxide is precipitated, but some prescribers like to give this in a freshly precipitated condition, and the reaction may have been foreseen and intended. In such a case the dispenser must follow the method which will yield the most finely divided and easily diffusible precipitate—that is, dilution of the reacting ingredients as far as possible before mixing them, with the addition, if necessary, of a suspending agent.

The student will readily recognise that a complete grasp of the subject of chemical incompatibility can only be attained by a diligent study of chemistry. A sound knowledge of the chemical properties of the substances used in medicine is necessary in order to recognise and deal with the incompatibilities which the dispenser may encounter. There are, however, some important groups of reactions which may be classified for the guidance of the beginner.

Acids and Alkalis.—These are clearly incompatible, but it happens not infrequently that an acid and an alkali are prescribed together, the prescriber, who has in mind mainly therapeutic effects, having overlooked the chemical reactions of the ingredients. The following lists may be useful:—

Alkaline.—Carbonates; bicarbonates; hydroxides; alkaline salts, such as sodium phosphate or borax; ammoniated spirits, liniments and tinctures; lime water.

Acid.—All acids (except hydrocyanic acid, which may be added to alkaline mixtures); vinegars and oxymels; syrups of squill, lemon, and ferrous phosphate; acid infusion of roses; caffeine citrate; solution of ferric chloride; bismuth oxynitrate and salicylate.

Precipitation of Metallic Salts. When precipitation occurs on mixing solutions of two salts in dispensing, it is necessary for the dispenser to understand what is happening and decide whether the reaction is intentional or ought, if possible, to be prevented. An example has previously been given in which it was probably desired by the prescriber. Two more examples will be discussed.

R	Zinc. Sulph.	gr. xl.
	Liq. Plumb. Subacet. Fort.	ʒ iss.
	Tinct. Opil.	ʒ ss.
	Aq.	ad ʒ vi.

In this lotion the prescriber has evidently overlooked the reaction that will occur between the lead subacetate and the zinc sulphate, all the lead being precipitated as sulphate and thus rendered useless. Such an oversight should be brought to the doctor's notice if possible; if this cannot be done, the prescription must be dispensed as written, as no alteration which would be permissible to the dispenser would prevent the precipitation. A similar instance is provided by the next example, in which the zinc is precipitated as borate or as a mixture of borate and hydroxide:—

R	Boracis.	gr. xx.
	Zinc. Sulph.	gr. v.
	Aq. Ros.	ad ʒ iij.

Soluble phosphates and carbonates form precipitates with salts of metals, such as calcium, magnesium, zinc, etc.

Formation of Deeply-coloured Solutions. The principal instances of this type of incompatibility are provided by salts of iron, which give characteristic colours with several organic substances. Thus, with preparations containing tannin, ferric chloride gives an unsightly black colouration due to the formation of ferric tannate. With salicylates it gives a purple colour; with acetates a red colour; with phenol a bluish-violet.

Liberation of Gases. The ingredients of a prescription may react together with the liberation of a gas. This may be a source of danger, for if the reaction is slow the gas will accumulate in the bottle in the small space between the surface of the liquid and the cork, and may develop sufficient pressure, especially if the bottle is kept in a warm place, to burst the bottle. Borax in the presence of glycerin reacts to form glycerylboric acid which decomposes bicarbonates, liberating carbon dioxide. Mention has already been made of the interaction between bismuth subnitrate and sodium bicarbonate, and bismuth salicylate and sodium bicarbonate behave similarly. In all these cases the reaction should be completed by stirring the reacting ingredients with hot water in a mortar and allowing the mixture to stand as long as possible before transferring it to the bottle.

Another instance is the decomposition which takes place when spirit of nitrous ether is mixed with a drug containing tannin. A reaction occurs in which the ethyl nitrite is decomposed with production of nitric oxide. In a dilute liquid, the reaction is slow and may pass unnoticed until the bottle bursts. The mixture should be allowed to stand uncorked for as long as possible before delivery and the patient should be warned to *l*

Precipitation of Organic Acids. Benzoic, salicylic and cinnamic acids are precipitated from solutions of their salts when the solution is made acid. A similar change takes place in the following prescription:—

B Quinin. Sulph.	gr. xv.
Acid. Sulph. Dil.	ʒi.
Ext. Glycyrrh. Liq.	ʒss.
Aq.	ad ʒiii.

The liquid extract of liquorice is here intended to cover the taste of the quinine; but the acid precipitates glycyrrhizic acid from the glycyrrhizin, making a turbid mixture and much reducing the sweetness of the liquorice. The prescriber, if accessible, may be asked to authorise omission of the acid and suspension of the quinine, or the use of another flavouring agent.

Precipitation of Alkaloids. Because of the high toxicity of many alkaloids, this class of incompatibility needs careful attention. If a solution of an alkaloid is dispensed with a substance which precipitates it, there is always the possibility that the precipitate may not be uniformly diffused and may settle to the bottom of the bottle, so that the patient may take an excessive amount in the last dose. For the detection of this type of incompatibility it is essential for the dispenser to be familiar with the substances which precipitate alkaloids.

(1) *Alkaline Preparations.* Most of the alkaloids are very slightly soluble in water, but their salts as a rule are easily soluble. The addition of an alkali to a solution of an alkaloidal salt will therefore cause precipitation of the free alkaloid unless there is a sufficiently large amount of water present. A most instructive case is that of solution of strychnine hydrochloride which is frequently prescribed with alkalis. The solubility of strychnine in water is about 1 in 7,000, which corresponds to 6 minims of the solution of strychnine hydrochloride in 1 fluid ounce of water. The addition of sodium bicarbonate or aromatic spirit of ammonia to such a dilution is quite safe because there is sufficient vehicle present to keep the strychnine in solution, but if a more concentrated preparation is made the alkaloid will be precipitated. A greater concentration is permissible if an alcoholic preparation is present, because strychnine is more soluble in alcohol than in water; also it should be remembered that tincture of nux vomica is safer than the equivalent amount of solution of strychnine, because the organic material in it tends to prevent the precipitation of strychnine.

(2) *Mercuric Salts and Iodides* separately will precipitate alkaloids, but they are especially dangerous together. Mercuric chloride and potassium iodide are frequently prescribed together in solution, and the mixture is really a diluted form of Mayer's solution, which is used as a precipitant of alkaloids. When solution of strychnine hydrochloride is added to such a mixture precipitation readily takes place. In some cases the problem of incompatibility may be dealt with by suitable manipulation. Such an example is provided by the following mixture:—

B Liq. Hydrarg. Perchlor.	ʒ iss.
Pot. Iod.	ʒii.
Syr. Zingib.	ʒss.
Ext. Cinchon. Liq.	ʒii.
Aq.	ad ʒviii.

The alkaloids of cinchona are precipitated by the mercuric

potassium iodide which is formed by interaction of mercuric chloride and potassium iodide and since the precipitate contains most of the mercury there is a danger that too much will be present in one dose. Add the syrup and half the water to the infusion, and the other half of the water to the other ingredients and mix the liquids, with only gentle shaking.

Solution of arsenous and mercuric iodides is another dangerous precipitant of alkaloids.

(3) *Organic Acids.* Salicylic, benzoic, and tannic acids are alkaloidal precipitants. The two former give intractable gummy precipitates with quinine in acid solution. Tannic acid is not likely to give rise to any danger because it is commonly used in the form of an alcoholic tincture of an astringent drug.

Liberation of Iodine. Oxidising agents liberate free iodine from iodides and the amount of iodine set free may be dangerous. Such prescriptions should not be dispensed without the confirmation of the prescriber. The following are the oxidising agents most likely to be met with:—Dilute nitric acid, dilute nitro-hydrochloric acid, tincture of ferric chloride and potassium chlorate. Spirit of nitrous ether becomes acid on keeping, and the free nitrous acid will liberate free iodine from potassium iodide. The acid should be neutralised by shaking with sodium bicarbonate before use.

The liberation of iodine in the following mixture is complicated by secondary reactions:—

R. Ferr. et Quinin. Cit.	℥ii.
Pot. Iod.	℥iii.
Syr.	℥vi.
Aq.	ad ℥iv.

The amount of acid in the solution of the double citrate is small, and iodine is only slowly liberated; iodine in potassium iodide solution is a general precipitant of alkaloids, and a nearly black precipitate of periodide of quinine will be produced. Addition of sufficient alkali to neutralise the solution of the iron and quinine citrate before adding to the iodide will considerably delay the reaction.

Oxidising and Reducing Agents. Many oxidising and reducing agents are capable of violent interaction and care should be exercised in handling such substances. The trituration of a chlorate with sulphur may result in an explosion and in no circumstances should this operation be carried out. The dispenser is advised to note carefully the following lists, which include the principal oxidising and reducing agents, and to regard each member of the one group as incompatible with each member of the other.

Oxidising Agents.—Chlorine, bromine, iodine, chlorates, nitrates, nitrites, chromic acid, chromates and dichromates, permanganates, peroxides, and ferric salts.

Reducing Agents.—Sulphur and sulphites, phosphorus and hypophosphites, ferrous salts, carbon and organic bodies especially formaldehyde, alcohol, sugar, glycerin, tannins, and volatile oils.

AROMATIC WATERS

These are often prescribed as vehicles for the administration of other medicaments. There are three official methods for the preparation of

aromatic waters. Some, like camphor water and chloroform water, are simple solutions, the others consist of aqueous solutions of volatile oils or volatile aromatic principles. These latter are of two types and may be prepared by (a) distilling the drug or volatile oil with water, or (b) diluting a concentrated preparation (*Aquæ Aromaticæ Concentratæ*) with water. Concentrated aromatic waters are weak alcoholic solutions of volatile oils. The distilled waters are usually superior in aroma, but if the prescriber wishes such a distilled aromatic water to be dispensed, he must specify it on the prescription as "*distilled*", otherwise the dispenser may dispense any of the types mentioned above.

EMULSIONS

When two immiscible liquids such as oil and water are shaken together, one of them is broken up and dispersed as globules in the other. The liquid in the globular form is said to be the *disperse phase*, whilst the one surrounding the globules is the *continuous phase*. The dispersion is only temporary and the globules of the disperse phase quickly coalesce to form a separate layer. By adding a substance which reduces the interfacial tension between the liquids and by suitable manipulation it is possible to render permanent the dispersion of one of the liquids in the other. The product of such an operation is an *emulsion* and the added substance which is capable of acting in this manner is an emulsifying agent or *emulgent*.

Types of Emulsions. Emulsions containing water and oil are classified according as the water is present as the continuous or the disperse phase. Those which contain water or an aqueous solution as the continuous phase are called oil-in-water emulsions and those in which an oil or fat constitutes the continuous phase are called water-in-oil emulsions.

Oil-in-water emulsions are particularly suitable for the internal administration of oils, since it is only the continuous aqueous phase which makes contact with the palate and incorporation of sweetening and flavouring agents in the aqueous medium masks the nauseous and greasy characters of the oil. A further advantage is that such emulsions are readily miscible with water. External applications are sometimes prepared in the form of oil-in-water emulsions, *e.g.*, liniments of ammonia and turpentine. Water-in-oil emulsions are rarely employed for internal administration, but are frequently used in the form of liniments, embrocations, ointments and creams.

"Cracking" and "Creaming". Emulgents are adsorbed at the surface separating two immiscible liquids and produce their effect by surrounding the globules of the disperse phase, thus reducing the tendency of the globules to coalesce and form a separate phase. If an emulsion has been carelessly prepared, the globules of the disperse phase may, on standing, unite to form a separate layer and the emulsion is then said to have "*cracked*." Addition of substances which tend to increase the interfacial tension between the two liquids will also promote cracking.

The separation of an upper layer of emulsion which contains a higher concentration of fat or oil than the main body of the emulsion is known as "*creaming*." A familiar example of this is milk, which is an oil-in-

water emulsion and which, on standing, separates into an upper layer of cream and a lower layer of milk. Both layers consist of oil-in-water emulsions, the only difference being that the cream contains a much higher percentage of disperse phase than the lower milk layer. Creaming is due to the fact that the dispersed globules of fat are of lower density than the continuous phase and consequently they tend to rise to the surface where they produce a more concentrated emulsion. If the disperse phase is heavier than the continuous phase (e.g., Emulsion of Chloroform and Liniment of Lime), the creaming will occur at the bottom of the emulsion.

An emulsion which has undergone creaming can usually be rendered homogeneous again by shaking, and creaming therefore is not so serious a defect as cracking, which cannot be reversed by the simple expedient of shaking. Nevertheless, creaming is unsightly and should be avoided since if it occurs to a large extent it results finally in cracking. The following factors influence the rate of creaming and a consideration of these will assist the dispenser in overcoming this difficulty.

- (a) *The difference in density between the disperse and continuous phases.* The greater the difference, the greater the tendency to cream.
- (b) *The radius of the globules of the disperse phase.* The smaller the size of the globules, the less the tendency to cream.

When an emulsion is made by hand, using a pestle and mortar, it is seldom possible to obtain the dispersed globules as small as when a modern emulsion machine or *homogeniser* is used. Hand-operated or power-driven emulsion machines are capable of producing very small globules of uniform size. They may be so small as to be of colloidal size, in which case the rate of creaming is very slow or negligible. As the size of the dispersed globules gets smaller the viscosity of the emulsion as a whole rises. This factor is of importance in the preparation of pharmaceutical emulsions, for whereas a particular formula when prepared by hand in a mortar may give an emulsion of suitable viscosity or thickness, the same formula prepared in a machine may be much too viscous and may even be unpourable from a bottle. The British Pharmaceutical Codex recognises this factor for it states that when an emulsion of the British Pharmaceutical Codex is prepared with the aid of a homogenising machine, the quantity of emulsifying agent specified in the formula may be reduced if necessary, provided that the final product contains the correct proportions of other constituents and that its viscosity as a whole is approximately equal to that of one made from the formula by hand in a mortar.

- (c) *The viscosity of the continuous phase.* It is obvious that the greater the viscosity of the continuous phase the greater will be the resistance to any movement of the dispersed globules and consequently there will be a decrease in the rate of creaming. It is therefore an advantage to use an emulgent such as mucilage of acacia, which is not only a good emulgent for preventing coalescence of particles but, being very viscous, is also a good suspending agent. Mucilage of tragacanth is a better suspending agent than acacia but is a very poor emulgent. Saponin solutions, on the other hand, are excellent emulgents but are useless as suspending agents.

- (d) *The ratio of the dispersed to continuous phase.* As the proportion of the former increases the tendency to cream will decrease, because the dispersed particles actually interfere with and impede each other. Thus in a highly concentrated emulsion the space may be so crowded with the dispersed globules that movement is impossible and creaming cannot occur. It is obvious that, in these cases, the viscosity of the continuous phase is not an important factor and consequently the *proportion* of acacia to oil required in a concentrated emulsion is less than that required in a weaker emulsion. In the latter case some extra acacia is necessary to increase the viscosity of the continuous phase.

The Preparation of Emulsions with Acacia. Small quantities of emulsions of the oil-in-water type, such as cod-liver oil emulsion, may be prepared in a mortar. It is essential that a primary concentrated emulsion should first be produced and dilution to the required volume must not be attempted before this has been accomplished. The method usually preferred in making the primary emulsion is to use fixed oil : water : powdered gum in the proportions of 4 : 2 : 1, or volatile oil : water : gum, 2 : 2 : 1. (These proportions are only suitable for emulsions which contain between 25 and 50 per cent. of oil. Hand-made emulsions containing less than 25 per cent. of oil will require more gum, preferably tragacanth, to prevent creaming. The proportions water 2, gum 1, must always be maintained.) The following directions should be observed:

- (a) Choose an ample-sized mortar. It is a mistake to cramp the space available for trituration.
- (b) Choose a flat-headed pestle. This gives a good shearing surface.
- (c) Add the oil and allow the measure to drain into the mortar.
- (d) Add the powdered acacia, immediately mix and without delay add the water. Briskly and lightly triturate, swinging the pestle so that the whole of the contents are operated upon. (Do not merely allow the pestle to swing along one circular track.) Continue trituration until a stable primary emulsion has been prepared, occasionally scraping around the top of the mortar and the pestle and returning the scrapings to the bottom of the mortar. The perfect primary emulsion will look smooth and white and will readily crackle with the movement of the pestle. It is very important that the powdered gum and the oil should not remain in contact with each other too long before adding the water. The oil may penetrate the gum and prevent its hydration with water to form mucilage. Powdered acacia, after prolonged contact with an oil may favour the formation of a reversed emulsion of the water-in-oil type and render the preparation useless.
- (e) Gradually dilute the primary emulsion with the vehicle. If the primary emulsion has been correctly prepared no degree of dilution will crack it. When, however, tinctures or other alcoholic liquids and salts such as citrates, glycerophosphates and hypophosphites have to be incorporated it is advisable to dilute these with the aqueous vehicle before adding to the diluted primary emulsion. One-sixth or one-quarter of the vehicle should be reserved for the purpose of diluting alcoholic fluids or dissolving salts.

Testing the Efficiency of Dispersion. The finished emulsion may be tested for efficiency of dispersion by placing about $\frac{1}{2}$ fl. oz. in a 10 fl. oz. measure and diluting with water nearly to the top of the measure. No oily globules should be visible at the surface of the liquid.

Machine-made Emulsions. The method of preparing emulsions by hand in a mortar requires considerable practice to get perfect results. It is moreover tedious and not comparable in efficiency and speed with the use of hand emulsion machines. These machines produce emulsions of a much finer degree of dispersion (*i.e.*, smaller globule radius) than can be produced by pestle and mortar. As a result, machine-made emulsions require less gum to prevent creaming. The principle utilised by machines is practically the same in all, that of forcing mucilage and oil, crudely mixed, through a very narrow shearing aperture. The following directions should be observed:—

- (a) If the machine has an adjustable aperture, arrange it for a coarse emulsion.
- (b) Stir the oil with mucilage of acacia in the proportions of about 4 : 3 in a measure so as to mix them crudely, pour into the machine and pass through.
- (c) Tighten the adjustment of the machine to give a fine emulsion and pass through a second time.
- (d) Dilute this primary emulsion as above.

Oil-in-Water Emulgents. The following are the principal oil-in-water emulgents:—

MUCILAGE OF ACACIA. This is probably the best emulent for medicinal fixed oils. Emulsions made with a good quality acacia usually keep well.

DECOCTION OF IRISH MOSS. The efficiency of this decoction increases if it is allowed to stand 18 hours before use. It is a good emulent provided a machine is used, but emulsions containing it are liable to fermentation and require a preservative. If a machine is used, equal volumes of the oil and decoction should be stirred together and the mixture passed through the machine twice.

YOLK OF EGG possesses approximately double the emulsifying power of powdered acacia, volume for weight. The yolk of an egg of average size measures from four to five fluid drachms and suffices for the emulsification of at least four fluid ounces of fixed oil or two fluid ounces of volatile oil. Yolk of egg emulsions are readily prepared in a hand machine adopting the same procedure as for acacia emulsions. They are not so liable to crack or separate upon the addition of alcoholic preparations, acid salts, diluted acids, glycerin, syrups or large quantities of soluble salts as are those prepared with acacia. Yolk of egg is therefore a suitable agent for the preparation of turpentine liniments containing acetic acid. Yolk of egg may be preserved by mixing it with an equal volume of glycerin and by this means it can be kept in a suitable condition ready for use; the emulsifying power of the mixture is approximately equal to that of mucilage of acacia.

MUCILAGE OF TRAGACANTH produces coarse emulsions and is, therefore, rarely used except in conjunction with other emulsifying agents to increase the viscosity and prevent creaming.

SOLUBLE CASEIN is a compound of casein with a small proportion of alkali. Casein is obtained from a very similar protein, caseinogen, which is the emulgent present in milk. Soluble casein is precipitated by acids and the latter, therefore, must not be added to casein emulsions. Soluble casein emulsions are not readily prepared in a mortar but good emulsions are easily obtained in a hand machine. Soluble casein equal to one-tenth the weight of fixed oil is triturated with the oil in a mortar, water equal in volume to the oil is then incorporated and the mixture passed through the machine. A good primary emulsion is obtained which may be diluted in the usual manner.

EXTRACT OF MALT. The well-known combination of cod-liver oil and extract of malt is a coarse emulsion, the high viscosity of the extract dispersing the oil and also preventing creaming. In preparation, the extract may be warmed to reduce the viscosity and facilitate mixing.

SAPONINS, generally in the form of the tinctures and liquid extracts of quillaia and senega, are sometimes ordered but in consequence of their therapeutic activity they should only be employed when so ordered, and never used by the dispenser in cases when the choice of the emulgent is left to him. The emulsions are unsatisfactory as they do not make the continuous phase sufficiently viscous to prevent creaming. Tragacanth can be added with advantage for this purpose.

One part of tincture of quillaia will emulsify eight parts of fixed oil or one part of volatile oil. The requisite quantity of tincture of quillaia should be diluted with two parts of water and thoroughly shaken in an ample-sized bottle with the oil until emulsification is obtained. Four grains of saponin dissolved in 120 minims of water will emulsify 1 fluid ounce of fixed oil when shaken with it. Emulsions made with quillaia or saponin are not affected by the addition of substances liable to "crack" acacia emulsions.

SOAP. Sodium, potassium or ammonium soaps form very good oil-in-water emulsions but because of their taste are unsuitable for use in emulsions for internal administration. They are often used for the preparation of liniments, etc. A good example is liniment of turpentine, B.P.

Balsam of copaiba contains an acid resin and a volatile oil, and when the following prescription is dispensed a soap is formed by interaction of the alkali and the resin acids. The soap serves as an emulgent for the volatile oil in the balsam.

R. Copaib.	3 iv.
Sp. Ether. Nitros.	2 ij.
Liq. Pot. Hydrox.	2 ij.
Syr.	3 iv.
Aq. ....ad	3 vj.

The emulsion, however, rapidly creams and it will be found an advantage to add 3vi of mucilage of acacia. A more ethical emulsion would be prepared by using mucilage of acacia alone and omitting the alkali, since then the medicament would not be altered by the emulgent, thus following a very sound pharmaceutical principle.

It occasionally happens that ammonia solution is prescribed with a vegetable oil such as olive oil, as in the following liniment:—

Dilute Solution of Ammonia	1
Almond Oil	1
Olive Oil	2

In this case the ammonia reacts with the free fatty acids in the oils forming an ammonium soap which then emulsifies the remainder of the oil, giving an oil-in-water emulsion. If the oils have a very low acid value insufficient soap may result and no emulsion form. In such cases it is advisable to add a little oleic acid.

SULPHATED FATTY ALCOHOLS. These substances have recently been introduced as emulgents for preparing oil-in-water emulsions for external use. The form in which they are used is a mixture of cetyl-stearyl alcohols which have been partially sulphated (about 10%). This emulgent can be conveniently kept as a 4% dispersion, made by allowing the material to melt on the surface of water which has just ceased boiling, and shaking to achieve dispersion of the molten wax. In the preparation of emulsions (*e.g.*, of benzyl benzoate or methyl salicylate) the oily liquid is placed in an ample-sized bottle and is shaken vigorously with the appropriate amount of the 4% dispersion. The primary emulsion so formed can then be diluted to produce the required volume. Alternatively, the wax may be melted on a water-bath and mixed with the oily constituent. The mixture is then poured into previously warmed water and stirred thoroughly. Where frequent use is made of this emulgent, it will be found less tedious to adopt the method using a 4% dispersion.

Water-in-Oil Emulgents. Water-in-oil emulsions are rarely required for internal use, since the oily phase is usually the medicament and there would be no reason for dispersing an aqueous phase in it. They are, however, common as ointments, liniments, etc., and are best considered here.

WOOL FAT is a commonly used water-in-oil emulgent. Good examples of its uses are the *Oculenta B.P.*, and *Ung. Belladonnæ B.P.C.* In all these cases wool fat is used to incorporate an aqueous or hydro-alcoholic liquid.

WOOL ALCOHOLS consist of a mixture of cholesterol and other alcohols obtained from the grease of wool of sheep. It is used in the Sixth Addendum to the *B.P.* 1932 as an emulgent in the preparation of hydrous ointment and many other official ointments. A mixture containing 5% of wool alcohols in soft paraffin is capable of emulsifying three times its weight of water. Emulsions prepared with this emulgent are stable in the presence of weak acids, such as citric and tartaric acids.

SOAPS OF A DIVALENT BASE. Calcium, magnesium, zinc, etc., oleates and stearates give rise to water-in-oil emulsions. These emulsions are usually ointments or liniments and may result from the action of a solution of the hydroxide on free fatty acids in vegetable oils. Thus liniment of lime, *B.P.C.*, contains

Olive Oil	500 ml.
Solution of Calcium Hydroxide	500 ml.

A poor emulsion may result if the oil has a low acid value, in which case it is advisable to add a little oleic acid. A similar case occurs in zinc cream, *B.P.C.*, which contains

Zinc Oxide	320 g.
Wool Fat	80 g.
Almond Oil	320 ml.
Solution of Calcium Hydroxide	to 1000 g.

WAX. White wax or beeswax is in common use in furniture polishes as an emulgent for aqueous liquids. In Emulsio Acriflavinae B.P.C. it emulsifies the aqueous solution of acriflavine.

RESIN favours water-in-oil emulsions but is rarely employed as an emulgent, wool fat or wax being better.

Antagonism of Emulgents. No single emulgent will form both oil-in-water and water-in-oil emulsions. It always favours one type only, and when two emulgents occur together in a preparation they may assist or oppose each other. The following formula, which was previously the official formula for hydrous ointment, provides an interesting example of the antagonistic action of two emulgents:—

Distilled Water	240 ml.
Borax	10 g.
White Beeswax	125 g.
White Soft Paraffin	125 g.
Olive Oil.....	500 ml.

During the preparation, the alkalinity of the borax results in the formation of a sodium soap with the small amount of free acid present in the oil and wax. This soap forms a very white oil-in-water emulsion. Very soon, however, the wax exerts its effect and the phases change place, resulting in the final production of a water-in-oil emulsion.

In dispensing practice it is often necessary to emulsify substances containing much resin, such as copaiba and extract of male fern. The following is typical:—

B. Ext. Filic.....	℥ iii.
OL. Terebinth.....	℥ ii.
Aq.	ad ℥ iv.

If the extract of male fern is dissolved in the turpentine and the solution triturated in a mortar with the gradual addition of the water the resin in the extract of male fern will act as an emulgent and a thick, very stable dark green emulsion will result but it will be of the water-in-oil type and quite unsuitable. In order to prepare a stable oil-in-water emulsion it is necessary to use acacia, and, if made in a mortar, the above formula will require 3 drachms of powdered acacia for the extract and 1 drachm for the turpentine. Had these two ingredients been fixed oils the total acacia required would have been $1\frac{1}{4}$ drachms. The large increase is necessary in order to overcome the influence of the resin which is tending to form the reverse emulsion. Thus extract of male fern, balsam of copaiba, balsam of peru, etc., require an equal weight of acacia for emulsification.

EYE DROPS AND EYE LOTIONS

Eye Drops. Drops for the eye are solutions of alkaloids or other substances in water or oil. It is advisable to dispense them as sterile preparations, adopting the methods used for the preparation of parenteral injections. Drops isotonic with lachrymal secretion or tears are sometimes required and should be isotonic with a 1.4 per cent. solution of sodium chloride. Eye drops should be dispensed in special dropping bottles.

Eye Lotions. Eye lotions are usually solutions in water of one or more substances. As far as possible they should be sterile and they

should be entirely free from foreign matter. It is advisable to prepare them by the methods used for parenteral injections, dispensing them in sterile stoppered bottles of distinctive shape.

Isotonic Eye Lotions. (*See also* p. 74.) To prepare an aqueous solution of any one of the following substances so that it is isotonic with the lachrymal secretion, the quantity given below should be dissolved in sufficient water to produce 100 millilitres (4 fluid ounces).

Boric Acid.....	3.1 grammes	54 grains).
Potassium Nitrate.....	2.4 grammes	42 grains).
Sodium Bicarbonate.....	2.0 grammes	35 grains).
Sodium Chloride.....	1.4 grammes	24 grains).
Sodium Nitrate.....	2.0 grammes	35 grains).

PILLS

By far the greater part of the pills produced to-day are made in large quantities by machinery. The dispenser is not concerned with these wholesale quantities, but with the preparation of batches of pills supplied to individual patients on medical prescriptions. There is, of course, far greater variety in the formulæ that are made at the dispensing counter, and far more difficulties are encountered than in the manufacture of large quantities.

Guiding Principles. Before discussing the difficulties in detail and the methods of overcoming them, we may recall the objects which are to be aimed at and which are the same for pills as for mixtures. We have previously stated these to be (1) preparation of the medicine in a form in which it can be readily absorbed or assimilated, (2) even distribution of the medicaments among the doses, and (3) the prevention of mutual decomposition or interaction between the different medicaments if they are liable to such change, except in those cases where the reaction is known to be desired. Applying these general principles to the case of pills, we see that (1) requires the pills (and the coating, if there is any) to be easily dissolved or disintegrated in the stomach; (2) requires the pill mass to be homogeneous and divided into pills of equal weight. Besides these therapeutic requirements the pills should be as agreeable to take as possible (*e.g.*, not larger than necessary), and should be well rounded and retain their shape when kept under average conditions.

The Excipient. It is sometimes the case that the particular medicaments ordered in a pill are of such a nature that by merely mixing them and well working together with the pestle, a mass results which is suitable for rolling and dividing into pills. This, however, is quite an exception; as a rule, it is necessary to add some inert ingredient or ingredients in order to make such a mass. The inert substance added for this purpose is known as the *excipient*, the selection of which and the quantity used is usually left to the discretion of the dispenser. Even when the prescription includes an excipient, it is recognised that a dispenser is within his rights in altering it if it is advantageous to do so. The active ingredients may be powders or substances that can be powdered, or even partly powders and partly liquids (*e.g.*, essential oils), which, when mixed, form a dry or nearly dry material,

and in such case the excipient must be capable of binding the powder into a mass. On the other hand, the ingredients may be wholly or in part extracts or liquids, so that when mixed a fluid or semi-fluid material results; in this case the kind of excipient and manipulation required will be the reverse of those used in the former instance. While the number of substances that may occasionally be required as excipients is large, a small number suffices for most ordinary pills.

Excipients vary considerably in their physical characters. They are usually either more or less viscous liquids, powdered gums, vegetable powders, powdered soap, or chemically inert substances such as kaolin. The choice of the excipient is very important, for the latter should not exert a medicinal action of its own or affect that of the medicaments, neither should it render the mass insoluble, for it is important that the pills should dissolve or disintegrate readily on being swallowed. Any excipient which prevents this must be carefully avoided. When the ingredients of the pills are colourless it is desirable to avoid introducing a coloured excipient; lactose may be employed when a diluent is required, and syrup of liquid glucose as excipient. The following excipients are in general use:—

SYRUP OF LIQUID GLUCOSE forms a very satisfactory general excipient for massing ingredients which contain fibrous matter or, in conjunction with a little powdered gum, for substances which contain no binding material. A mass made with this excipient usually disintegrates readily.

LIQUID GLUCOSE may replace syrup of liquid glucose with advantage when greater cohesiveness is wanted. Its viscosity makes it a difficult excipient to manipulate.

GLYCERIN OF TRAGACANTH requires to be very sparingly used since excess may produce an elastic mass which is difficult to convert into spherical pills.

POWDERED GUM, in the form of acacia or tragacanth, or a mixture of equal parts of each, known as compound powder of acacia (*Pulvis Acaciæ Compositus*), is a valuable addition when there is no binding material in the ingredients. Not more than about 5 per cent. should be added, the pills being massed with syrup of liquid glucose.

LIQUORICE, in powder, possesses excellent absorbent properties. By virtue of its fibrous nature it is an ideal combination with syrup of liquid glucose for producing a mass. It is also useful for stiffening masses containing soft extracts.

POWDERED SOAP can be used with advantage to absorb volatile oils or substances of a similar nature, the mass being subsequently stiffened with powdered liquorice. 1 minim of oil usually requires 1 grain of powdered curd soap and about 1½ grains of powdered liquorice to stiffen it.

KAOLIN, or **DIATOMITE**, with wool fat is a useful excipient for substances such as potassium permanganate, potassium dichromate, silver nitrate, etc., which cannot be massed with the usual excipients because they require chemically inert diluents. The medicament should be made into a paste with the minimum quantity of wool fat and then stiffened by the addition of kaolin or diatomite.

The following *scheme for the preparation of pill masses* is of almost general application.

- (a) When binding material, such as gum, fibre, or soft or dry aqueous extracts, is present, the ingredients should be massed with syrup of liquid glucose.
- (b) When no binding material is present for such substances as camphor, sulphur, thymol, resins, reduced iron and crystalline substances such as ferrous sulphate, 5 per cent. of compound powder of acacia should be added and the ingredients massed with syrup of liquid glucose. In certain cases it is advisable to substitute liquid glucose for the syrup, to give greater cohesiveness.
- (c) Volatile oils and similar substances should be absorbed in powdered curd soap, and the mass stiffened with powdered liquorice.
- (d) Oxidising substances, such as potassium permanganate, should be made into a paste with the minimum amount of wool fat, and the mass stiffened with kaolin or diatomite.

Some Rules to be Observed. The following are a few rules for pill-making which dispensers should observe.

(1) Make a note in the prescription book of the excipient, the amount used, and the weight to which the pills are made up, so that if they are repeated they may be of the same composition and size.

(2) The diameter of pills should rarely be less than $\frac{1}{8}$ inch (about 1 grain in weight) or more than $\frac{1}{4}$ inch (about 5 grains in weight). When the latter size is exceeded it is advisable to divide the quantity into two pills.

(3) If any alteration is made in the prescription, as is sometimes necessary (*e.g.*, replacing a hydrated salt by the equivalent weight of the dried, or dividing one pill into two), or if a pill of very small weight is made up to 1 grain, a note should be made in the prescription book.

(4) If all the ingredients of a pill are white do not use a dark excipient, but dispense as a white pill if possible.

(5) If a volatile ingredient is ordered, or one which is liable to be decomposed by contact with the air, the pills should be coated. A note should be made in the prescription book.

Weighting Fractions of a Grain. It not infrequently happens that a small fraction of a grain of an active ingredient is ordered in one pill, and the number of pills to be made requires less than a grain of this ingredient to be taken, perhaps a rather inconvenient fraction. The difficulty may, of course, occur equally in dispensing powders and other forms of medicine, and the following remarks apply in all such cases. The following is a case of this kind:—

R Strychnine.....	gr. $\frac{1}{10}$
Arsen. Trioxid.....	gr. $\frac{1}{10}$
Ferr. Redact.....	gr. iiss.
Ft. pil. i. Mitte xxiv.	

The ordinary dispensing scales and weights cannot usually be trusted for quantities less than 1 grain; the quantities here required are strychnine 24/60ths, or 2/5ths, arsenious acid, 24/50ths, or 12/25ths. Weigh out 1 grain of strychnine, and $1\frac{1}{2}$ grains of lactose. Powder the strychnine, mix carefully and thoroughly with the lactose, and take 1 grain of this mixture for the prescription. Weigh out 1 grain of arsenious acid and $11\frac{1}{2}$ grains of lactose, mix thoroughly, and take 6 grains of the mixture for the prescription. Reduced iron does not bind well and a little

compound powder of acacia is desirable to prevent the mass from crumbling. For the quantity here ordered, 2 grains of compound powder of acacia may be employed, and the mass then made with syrup of liquid glucose.

Manipulation. The art of making good pills involves a good deal more than merely selecting the right excipient, and proper familiarity with the necessary manipulation can only be obtained by experience. An amount of excipient which, gently stirred into a powder, would barely suffice to make it sticky, may be ample to make it into a soft mass if well worked into it; this is no doubt partly due to the fibres in the powder being squeezed closer together and a large quantity of them therefore becoming coated with a given quantity of the sticky material present, but it is also partly the result of the heat generated by the friction, which softens ingredients of an "extract" or resinous nature, and so helps them to spread further. The mass should be rolled out and cut into pills as soon as it is made, and the pills rounded off. After a few minutes a well made mass will in most cases become appreciably harder, and it is best for this only to occur after the pills are made.

Preparation of the Mass. Choose a suitable size pill mortar, remembering that the chief action in pill making is obtaining pressure on the mass by a lever action of the pestle, using the side of the mortar as the fulcrum. A small mortar is preferable, therefore, to a large one. Thoroughly mix all the ingredients that are powders in ascending order of weight before adding any excipient or ingredient of a binding nature. Never trust to powders becoming mixed in the process of massing. Special care should be taken to distribute evenly very potent ingredients such as arsenic trioxide or atropine sulphate.

The excipient should be added to the ingredients a little at a time and then thoroughly incorporated before further addition. This is very important as it is easy to add an excess and produce too soft a mass. The pestle action should be a vigorous one, plenty of pressure being used. The friction will generate heat and this, by softening the mass, tends to facilitate the massing. A correctly prepared mass will generally come away from the pestle and sides of the mortar quite readily. The consistency should be such that it will retain its shape on standing and yet be soft enough to roll into pills.

The mass is next rolled out into a pipe or cylinder of perfectly uniform thickness with straight and not rounded ends, so that when cut into pieces of equal length by the cutters on the machine, pills of even size will result. For the beginner this operation is not an easy one so care must be taken.

Cutting and Rounding. The pill pipe is placed on the fixed cutter so that it covers the number of divisions corresponding to the number of pills required. The pipe is cut by applying the upper cutter and using a rapid to-and-fro movement. If the pill machine is the correct size, the pills so produced will be almost round and will require little further rounding with the roller. It often happens that pills have to be made in a machine that is intended for a larger pill, say 3-grain pills on a 4-grain or 5-grain machine, and in this case the cutting will not, as a rule, give round pills but elongated ones; it is then necessary to make each pill approximately round by pressure between finger and thumb, in order

that they may run when rotated under the rounder. The art of using the rounder is not difficult to acquire; a circular rotatory motion is required, the pressure being very gentle at first, then gradually increasing to a maximum varying with the hardness of the mass, and again diminishing as the motion is reduced or stopped. In rolling and rounding pills, as in massing, the heat generated by friction plays an important part; a very hard mass may be made quite plastic by vigorous handling and a few minutes after the pills are finished they will be quite hard and in no danger of losing their shape. It is usually desirable to use a little lubricating powder to prevent the mass from sticking to the machine in rolling, cutting and rounding. French chalk is the most suitable powder for this purpose. It should never be thrown on to or sprinkled on to the mass as this yields a speckled mass. The powder should be rubbed on to the machine and excess wiped away before the mass is manipulated in piping or rounding. The pills should never be packed in excess of powder as this detracts from their appearance. Properly prepared pills will not stick together.

The beginner will experience great difficulty in the preparation of white pill masses such as camphor, etc., and will learn the advisability of great cleanliness. Such pills quickly prove the necessity of thoroughly cleansing the pill machine and cutters and rounders before use and of having well-washed hands. Although such a pill demonstrates this necessity, the dispenser should bear in mind that it is just as essential to adopt equally cleanly methods with other pill masses.

Special Types of Pills. It is impossible to lay down general rules for massing pills which will cover every case. Some medicaments may require special treatment and special excipients. The following are a few examples of this class:—

CREOSOTE. This is often prescribed as 1 minim per pill. The following methods may be adopted:—

(a) Treat it as an ordinary volatile oil, absorbing it in curd soap (1 gr. for each minim of creosote) and then stiffening with powdered liquorice.

(b) Use the following proportions:—

Creosote	10 m.
Powdered Liquorice	8 gr.
Water	1 m.

Thoroughly incorporate the water in the powdered liquorice and then incorporate the creosote. A surprisingly stiff mass results.

A hard mass can be obtained by absorbing creosote on light magnesium oxide but chemical interaction takes place and this method should not be used.

PHENOL. This is not infrequently ordered in pills and is apt to give some trouble. There are several ways of dealing with it, and the particular excipient to be employed in a given case will depend to some extent on what other ingredients are in the prescription, as well as on the usual practice of the dispenser. Powdered marshmallow root with a small quantity of acacia may be employed, and the mass made with syrup; or liquorice with a trace of mucilage may be used. Perhaps the excipient in most favour is powdered soap; if this is to be used, only neutral soap is permissible since any alkali will combine with the phenol; it has been objected that even a neutral soap may react with the phenol and partly

neutralise it, but this is not likely to occur to any serious extent. The quantity of soap may be from $\frac{1}{4}$ to 1 grain for each grain of phenol. If no powdered vegetable drug is in the prescription a little liquorice will be an advantage; in some cases a little tragacanth and syrup will also be necessary.

PHOSPHORUS. When phosphorus is prescribed in a pill, the method described for phosphorus pill in the B.P.C. should be adopted.

QUININE. Quinine is frequently ordered in pills, both alone and with other ingredients; it does not as a rule present particular difficulty. It is desirable that a soluble salt should be employed, and when the sulphate is ordered it is usual to add a little acid, which both assists the massing and gives a more soluble product. If it is required to keep the size of quinine pills as small as possible they may be made up with dilute sulphuric acid alone; a very small quantity suffices to yield a workable mass. In this case part of the quinine is converted to the bisulphate, a soluble salt.

CALCIUM SULPHIDE. This should be mixed with a small quantity of lactose and then massed with glycerin of tragacanth.

OXIDISING SUBSTANCES. Substances such as potassium permanganate, potassium dichromate, silver nitrate, etc., which are rich in available oxygen cannot be massed with the ordinary excipients because of interaction. Indeed if the attempt be made with potassium permanganate the mass will catch fire in the mortar. Such substances should be powdered and the powder rubbed up with just sufficient anhydrous wool fat to make a stiff greasy paste. Kaolin should then be incorporated gradually until a suitable mass is obtained.

Pill Ingredients which Interact. Chemical reaction between the ingredients of a pill does not take place as easily as between the constituents of a liquid mixture, but nevertheless it cannot be ignored. In certain cases it may be the prescriber's intention that double decomposition shall take place, but in others, such action may not have been foreseen. If it is clear that reaction is not desired, the ingredients which are liable to affect one another must, of course, be kept as much out of contact with one another as possible. This can usually be managed better in pills than in mixtures, since each can be diluted with some other ingredient or an inert powder or excipient before mixing, or they may even be made into separate masses and these finally mixed. By these means the proportions of the two ingredients that react together may be kept very small. But in other cases reaction between two ingredients is intended, and the pills are required to contain the freshly-made product of the double decomposition. The most important example of this is Blaud's pill, officially represented by the *Pilula Ferri Carbonatis*. Blaud's pill is intended for the administration of ferrous carbonate. This substance is rapidly decomposed if kept exposed to the air, the principal product being ferric oxide, and it is therefore necessary to prepare it freshly. For this purpose exsiccated ferrous sulphate is mixed with liquid glucose and water, and exsiccated sodium carbonate added. The water dissolves a portion of each salt, these at once reacting together to form sodium sulphate and ferrous carbonate. Further quantities of ferrous sulphate and sodium carbonate are then dissolved and react, and this process goes on continuously. After a few minutes the whole quantity

of these salts has become converted to ferrous carbonate and sodium sulphate. The glucose protects the ferrous carbonate from oxidation. In the pharmacopœial directions ten minutes' standing is ordered for the completion of the reaction; acacia and a little tragacanth are then added, and the whole worked into a mass. When the pills are dry the ferrous carbonate is out of contact with the air, except on the extreme surface, and will keep unchanged for some time; even surface action is usually avoided by coating the pills. The pills do, however, tend to become very hard on prolonged storage and may then fail to disintegrate on being taken. This has led to Blaud's Pill being regarded, somewhat unfairly, by hæmatologists as an inefficient preparation. Blaud's pill, therefore, should be freshly prepared. If, as sometimes happens, this pill is ordered in combination with other ingredients, they must be added at an appropriate stage of the making. A few instances are here given:—

R Arsen. Triox.	
Strych.	aa gr. $\frac{1}{2}$..
Aloin.	gr. $\frac{1}{2}$.
Pil. Ferr.	gr. iv.
Ft. pil. i. Mitte xxxvj.	

The first three ingredients should be thoroughly mixed together, and then with the water, liquid glucose and exsiccated ferrous sulphate. They will not interfere with the subsequent reaction and their proper distribution is most effectually secured.

R Ext. Aloes	gr. xij.
Pulv. Nuc. Vom.	gr. vi.
Pil. Ferr.	ad \mathfrak{z} iv.
M. ft. pil. 48.	

The nux vomica may be mixed with the liquids as in the previous case; but as the extract of aloes would appreciably retard the reaction, it should be mixed with the acacia and tragacanth, and added with them when the change is complete.

R Mang. Diox. Præcip.	gr. ij.
Pil. Ferr.	gr. iij.
Ft. pil. i. Tales xxiv.	

In this case the iron pill mass should be made first and the manganese peroxide added afterwards, as otherwise it would almost certainly react to some extent with the sodium carbonate.

Coating. Pills are coated for a variety of reasons. Sometimes the type of coating may be ordered by the prescriber and sometimes the dispenser may, on his own initiative, coat pills, although such coating is not prescribed. The coating of pills is advisable when the ingredients are liable to change on exposure to air or are of a volatile, bitter or nauseous character. Protective coatings of this type consist of varnish, gelatin, sugar, silver leaf or a pearl coating. When medicaments are required to act in the intestines and not in the stomach an enteric coating is usually applied.

VARNISH COATING. Several formulæ for pill varnishes are in use. They are either solutions of sandarac in alcohol, alcohol and ether, or chloroform and ether, or are made by macerating balsam of tolu, after it has been used for making the syrup, in ether. One part of spent tolu in three parts by measure of ether is a suitable strength, the undissolved

portion being separated by pouring off. For sandarac varnishes the following may be used:—

- | | |
|------------------------|-----------------|
| (1) Sandarac | 4½ parts. |
| Chloroform | 4 fluid parts. |
| Ether | 10 fluid parts. |
| (2) Sandarac | 1 part. |
| Absolute Alcohol | 2 fluid parts. |
| Ether | 1 fluid part. |
| (3) Sandarac | 1 part. |
| Alcohol | 2 fluid parts. |

A varnish made with ether will, of course, dry most quickly, and one in which alcohol is the solvent most slowly. When the solvent is likely to have any effect on anything in the pill itself, the most rapid drying is obviously preferable.

The method of varnishing is extremely simple. The pills, which must not have any powder on their surfaces, are put into a covered pot, a little varnish added (usually two or three drops to a dozen 5-grain pills), and the pills shaken and rotated in the pot for a few moments. They are then turned out on to a tile or plate coated with a very thin film of almond oil, separated from one another with the least touching possible, and allowed to dry. Before they are quite dry they should be moved about a little by giving a slight rotatory movement to the plate or by a spatula similarly coated with a thin film of oil. The spot which has been in contact with the plate during drying is then not apparent.

SILVER LEAF COATING. When pills which are to be silver-coated contain any ingredient capable of acting on a thin layer of silver, they must be varnished before coating. The application of the silver leaf may be carried out in a covered pot, or in one of the boxwood "silver coaters" supplied for the purpose. One silver leaf of the ordinary size is usually required for each six 5-grain pills, and the leaf is put into the pot or box first. The pills are then shaken in another pot with a few drops of dilute acacia mucilage till every part of each is moistened with it, using the least quantity of mucilage that will suffice, and turned into the pot containing the silver. This pot is closed and rotated, shaking smartly once or twice to ensure that the pills are separated. The rotatory motion is continued until the pills are uniformly covered.

SUGAR COATING can only be applied satisfactorily to large quantities of pills by machinery adapted for the purpose. When a sweetened pill coating is required at the dispensing counter, it is customary to use purified talc containing 2 per cent. of soluble saccharin or a small percentage of sugar.

PEARL COATING, unlike sugar coating, can be carried out at the dispensing counter. It consists in building up successive layers of purified talc on the pills with the aid of mucilage. The pills should preferably be fairly hard. Elegant results depend to some extent upon practice, and more especially upon the application of a suitable amount of adhesive solution to the pill previous to coating. The following method has proved satisfactory in practice:—Varnish the pills with a sandarac varnish and transfer while still wet to a covered pot containing a small quantity of purified talc, which may be sweetened with soluble saccharin. Rotate five or six times, and transfer the pills to a pill rounder; remove any superfluous talc by rotating and rubbing the pills on the rounder

with demy paper; place a few drops (about 4 drops for each dozen 5 grain pills) of pill-coating mucilage (mucilage of acacia, 1 part; syrup, 1 part; distilled water, 4 parts) in a dry, covered pot; add the pills; rotate a few times and transfer to another pot (concave within) containing a small quantity of purified talc; rotate gently and not too rapidly for about ten to fifteen seconds; transfer to an inverted lid, and rotate gently for a minute; set aside to dry for at least fifteen minutes, and finish by rotating the pills in a dry pot (concave within) until they have a uniform and polished appearance. The process, excluding the quarter of an hour during which the pills are set aside, usually occupies less than ten minutes if the requisite materials are ready to hand.

GELATIN COATING. A thin layer of gelatin forms a suitable protection in many instances, and, being transparent, it does not change the appearance of the pills except by giving a glazed surface instead of a dull one. Various formulæ are in use for the gelatin solution that is used, the following being probably the one most frequently employed:—

Gelatin	4 oz.
Gum Acacia	1 oz.
Boric Acid	$\frac{1}{2}$ oz.
Water	2 pints.

Soak the gum and gelatin in the water for some hours, then dissolve with the aid of gentle heat (a water-bath should be employed to avoid burning), and add the boric acid; strain if necessary. This forms a solid mass when cold and is melted on a water-bath for use. The pills to be coated are stuck on the points of needles, the eye-ends of the needles being fixed in corks which serve as handles; a dozen or more needles may be fixed in one large cork. The pills are dipped into the melted jelly and withdrawn. They are held turned downwards till a drop of the surplus liquid forms on each, and these drops are then removed by just touching the surface of the liquid with them. The cork, with the needles and pills, is then turned the other way up and the coating left to dry. In gelatin coating on the large scale needles are not used, but the pills are held by vacuum against small tubes and dipped half-way only into the gelatin solution. When the coating has dried the pills are held by the coated side and the other half is then dipped.

ENTERIC COATINGS are employed for covering pills which are intended to pass through the stomach and exert their effect in the intestines. When the medicament is such that it may be inactivated in the stomach, or depends for its efficient action on being released in the intestines in a concentrated form, the efficiency of the coating is of great importance. The efficiency may be tested by immersing the pills in a dilute solution of hydrochloric acid and pepsin at 37° for two hours with occasional shaking, and then under similar conditions in an alkaline pancreatin solution. The pills should not disintegrate in the former, but should do so in the latter solution. The efficiency of the coating may be destroyed if it should crack owing to the expansion of the pill mass at body temperature. Salol coatings are very liable to do this. Enteric coatings in general use are:—

FORMALDEHYDE-GELATIN OR GLUTOID COATING. The pills are gelatin coated, allowed to dry, then immersed in a solution of formaldehyde (2 per cent. H·CHO) for fifteen minutes and dried. This coating is usually satisfactory and rarely cracks.

STEARIC ACID. This may be applied by rotating the pills in a little melted stearic acid in a round-bottomed flask for a few seconds, and then jerking the pills out on a large sheet of paper so that they roll sufficiently far for the coating to set. The pills may then be returned to the flask and the operation quickly repeated. In this manner any desired thickness of coating may be applied. The stearic acid in the flask should be kept just above its melting-point except for the first coating, when it is an advantage to have it at a somewhat higher temperature and therefore much thinner. When the pill mass is of a non-greasy character it is advisable to moisten the pills with a solution of white wax in ether, allowing the latter to evaporate. Unless this is done the coating tends to crack readily and peel off.

SALOL COATING. This may be applied in the same manner as stearic acid. Non-greasy pill masses should be similarly waxed before coating, otherwise the salol will not adhere.

KERATIN COATING. The pills are moistened by rotation in a pot with a 10% solution of keratin in equal parts of alcohol and strong solution of ammonia, and then shaken out on to an oiled tile to dry. The operation is generally repeated several times and three or four coatings applied. When the pill mass is of a non-greasy character it should be waxed as in stearic acid coating.

POWDERS

Powders may be prescribed for use in several ways; the commonest requirement is for internal administration, the mixing of the powder with a suitable vehicle being left to the patient. In other cases, one powder is to be taken with each dose of a mixture, the material of the powders being then usually one which reacts with an ingredient of the mixture, causing effervescence. Powders may also be ordered for external use, as dusting powders, etc., or for local application, such as to the throat by blowing the powder on with bellows, or for snuffing, etc.; these latter are usually termed insufflations and snuffs. When required for swallowing, powders are frequently ordered in the special form of cachets.

Considerably less difficulty may be expected in the dispensing of powders than in the case of mixtures and pills, since most of the trouble encountered in the other cases is due either to physical immiscibility or chemical incompatibility of the ingredients; and powders being in the same physical state can hardly be immiscible, while chemical action is less likely to occur between dry substances. It must not be supposed, however, that chemical reaction cannot occur between two substances when mixed in the form of powders; reaction does occur in quite a considerable number of cases, and the dispenser should always be on the look-out for such a possibility.

In dispensing powders which present no special difficulty accurate division of the medicament into equal doses becomes the chief consideration, and depends upon obtaining a perfectly homogeneous mixture of the ingredients. A few simple rules must be observed to this end; thus, powdering and mixing simultaneously should never be attempted, but if a substance in crystals, granules, or coarse powder is to be mixed with a fine powder, it should itself be ground down to a fine powder first and the mixing then performed. If a very small quantity of one substance

is to be mixed with a much larger quantity of another, the latter should be added in small quantities at a time to the former, mixing thoroughly after each addition.

R Arsen. Triox.	gr. i.
Lactos.	ʒi.
M. Div. in pulv. xx.	

The arsenic trioxide must be mixed with two or three grains of the lactose very thoroughly, then three or four grains more lactose added and thoroughly mixed in, and the remainder of the lactose added in gradually increasing quantities. The mixing of powders may be effected either in a mortar or on paper with a spatula; there is a great deal to be said for the latter method, and in some cases it is certainly the better, *e.g.*, when friction would have a deleterious effect on any of the ingredients. If carefully and thoroughly performed, mixing on paper is probably as good in almost every case as mixing in a mortar when only a few grains are to be dealt with. In the case given above it will be best to mix in the first quantities of lactose both by trituration and on paper, and the final quantities in a mortar only. With some powders the friction that may be obtained by use of pestle and mortar is not only disadvantageous but dangerous; potassium chlorate, for instance, mixed with sugar or other organic and easily oxidisable substance, gives a mixture which may explode, owing to the heat of friction.

It is often better to divide one ingredient and mix portions of it with others separately, finally mixing the powders so obtained. For instance, in the following:—

R Strych.	gr. ʒi.
Arsen. Triox.	gr. ʒi.
Bism. Subnit.	gr. ii.
Pulv. Cinnam. Co.	gr. x.
Ft. pulv. i. Mitte tales lx.	

the following method should be adopted:—Weigh out 2 grains of strychnine, powder finely; weigh out 62 grains of compound cinnamon powder, and add it in small quantities at a time to the strychnine. When the mixing is complete, weigh 60 grains of this mixture and set aside, rejecting the remaining 4 grains. Then weigh out $2\frac{1}{2}$ grains of arsenic trioxide and 60 grains of compound cinnamon powder, and mix these together in the same manner, and put aside. Then weigh out 120 grains of bismuth subnitrate and 482 grains of compound cinnamon powder, mixing about a third of the latter with the bismuth salt. Then mix the diluted strychnine with the diluted arsenic trioxide, add the diluted bismuth subnitrate, and finally the remainder of the compound cinnamon powder.

Powders which Interact. Certain substances, when mixed in the solid condition, slowly react or combine, producing a liquid. The commonest example is, perhaps, chloral hydrate and camphor, and there are several substances giving similar results among the higher alcohols and phenols, such as menthol, thymol, etc. Probably, however, the only substances which show this behaviour and which are likely to be ordered as powders are antipyrine, with a salicylate. Antipyrine and sodium salicylate, for instance, may be prescribed together as a powder, and when mixed they form a liquid containing antipyrine salicylate.

In this case, if the dispenser can refer to the prescriber, he may suggest that an equivalent dose of antipyrine salicylate be substituted; but if the prescriber is not accessible, the incompatibles should be dispensed separately, and the directions altered so that the two powders shall be taken together by the patient. Apart from such cases, however, reaction may occur between the ingredients of a powder if they are damp, as in the following:—

B Sod. Bicarb.	gr. xxii.
Acid. Tart.	gr. xx.
Ft. pulv. i. Mitte vi.	

Reaction may then be prevented by using the ingredients in perfectly dry condition and wrapping each powder in waxed paper, with white paper outside; the latter precaution must also be taken with all powders that have a tendency to absorb moisture and become damp.

Powders with Mixtures. If it is desired to give a mixture which shall be in a state of effervescence when taken by the patient, it is usual for one of its ingredients to be a bicarbonate, tartaric or citric acid being ordered in powders, one to be taken with each dose; in other cases, however, two mixtures, one acid and the other alkaline, are ordered, to be mixed at the time of taking. It is occasionally necessary to reverse the method and prescribe the bicarbonate in powders on account of some other ingredient, as in the following:—

B Liq. Strych. Hydrochlor.	℥ xl.
Syr. Limon.	3 iij.
Acid. Citric.	2 ij.
Aquam.	ad 3 vi.
℥ pro dos. c. pulv. uno, in stat. eff. sumend.	
B Sod. Bicarb.	gr. xxiv.
Ft. pulv. i. Mitte vi.	

Both the Solution of Strychnine Hydrochloride and the syrup of lemon would react with the sodium bicarbonate if it were in the mixture, strychnine being precipitated with possibly dangerous consequences.

Powders for Making Lotions. These are occasionally prescribed and should be dispensed in a manner quite distinctive from ordinary powders. They may be wrapped in red papers and packed in a box labelled "Not to be taken."

Dusting Powders. Dusting powders are not sub-divided into portions but dispensed in bulk, being sent out in dredgers. Essential oils in small quantity are not infrequently present, and these should be added to the most absorbent ingredient, or a small portion of it, and then further quantities of powder added until there is no longer an appearance of dampness. Liquid of any sort should never be added to the whole bulk of mixed powder. Dusting powders should be sifted finally, either through a fine-mesh metal sieve or through very fine muslin. It is a good plan to sift any powder in which the nature of the ingredients makes an extra mixing desirable.

Carmines is often a troublesome ingredient in dusting powders owing to the extreme care which is necessary to get a good dispersion of it. All the precautions necessary for the dispersion of a very toxic substance should be applied in this case otherwise batches of the same powder will vary in tint.

Insufflations. Insufflations are powders prepared for introduction into the ear, nose, or throat. They are administered by means of an insufflator, or, when intended for the nose, they may be used in the same way as ordinary snuff.

The British Pharmaceutical Codex contains four medicated snuffs. They should be dispensed either in wide-mouthed bottles, or flat pill boxes or, when an exact dose is necessary, as powders separately wrapped.

CACHETS

In order to facilitate taking by the patient, powders are often ordered to be dispensed in cachets (*Capsula Amylacea*). These are hollow receptacles consisting chiefly of rice flour; when dry they are stiff and brittle, but by dipping in water they are rendered very soft and can then be easily swallowed with a draught of water. The contents are not set free in contact with the tongue, hence the powder is not tasted. Cachets are made in halves and the method of filling is extremely simple. The mixing and weighing out of the powders are, of course, just the same as when they are to be wrapped in paper, but each powder is placed in one of the half-cachets, the edges of the other half are damped with water and the two halves pressed together. It is best to use the apparatus made for the purpose; in this the proper number of half-cachets are arranged in spaces provided for them in a metal plate, and the powders introduced by the aid of a small funnel. The other halves are arranged in corresponding places in another plate of the apparatus, and their edges damped with a roller; the plate carrying these is then brought over to the other, to which it is hinged, and by gentle pressure all the cachets are sealed simultaneously. Another type is the dry closing cachet. These are recommended in preference to the wet closing type on account of the ease with which they may be filled and sealed. Cachets are made in a variety of sizes, and the smallest which will hold the powder ordered should always be employed. A bulky material like quinine sulphate may be put into a much smaller space after it has been powdered in a mortar; this should always be done whether it is to be put in a cachet or folded in paper.

When labelling cachets, in addition to the directions of the physician, instructions should be given as to the method of taking them, such as "Immerse a cachet in water for a few seconds and then swallow with a drink of water."

Hygroscopic substances should not be prescribed in cachets but when so ordered it is advisable to mix them with powdered liquorice. Soft pill masses flattened into small discs and well covered with an inert absorbent powder such as diatomite may be dispensed in cachets.

Cachets should never be packed in cotton wool as this may adhere, and be unpleasant to the patient.

Bicachets should be used for substances which interact, the salts being placed separately in the halves of the cachet and separated by a single cachet disc of smaller diameter than the cachet which is being used.

CAPSULES

Capsules are sometimes used for administering powders; more frequently, however, cachets are employed for powders and capsules

for liquids or soft semi-liquid substances. The object is the same in both cases—namely, to enclose the medicament in a receptacle which can be easily swallowed whole, which will readily dissolve in the stomach, and which itself has no therapeutic activity. Capsule cases consist chiefly of gelatin with sometimes gum in addition. For dispensing purposes both soft and hard gelatin capsules are employed, the hard ones being intended for solids only, whilst the soft may be used for both solid and liquid medicaments.

Soft Capsules. The following formula yields a mass for soft capsules which is suitable for ordinary use:—

Gelatin	24 g.
Syrup	7 g.
Glycerin	18 g.
Mucilage of Acacia	6 g.
Distilled Water	to 100 g.

The capsules are prepared from this mass by dipping a mould into it, withdrawing, and drying the layer of glycogelatin. They are supplied sealed by the makers and are obtainable in various sizes having capacities 3, 5, 10, 15, 20, 30, 60 and 90 minims.

Generally the medicament is a liquid or thin paste and a sufficient quantity of it is put into the barrel of a glass or brass syringe and the capsules in turn are slipped on to the nozzle and filled by pressure of the piston.

When dry powders are to be placed in capsules they are prepared and weighed out as for powders or cachets. Each capsule in turn is attached to a small funnel by inserting the stem of the latter for a short distance into the open end, and the powder is shaken in through the funnel. As a rule, however, it is more convenient to mix the powder with liquid paraffin or other suitable oil to the consistency of a thin paste; the mass can then be filled into the capsules in the usual way from a syringe.

It is best to support the syringe in a vertical position by a clamp stand. Care must be taken not to fill the capsules completely, but to leave a small empty space at the top, or it will be difficult to secure proper sealing. It is convenient to stand each capsule when filled in an empty suppository or pessary mould or in a block of wood suitably bored with a number of cavities. The necks of the capsules are next trimmed almost away with scissors and they are ready for sealing. The sealing can be done by touching the mouth of each in turn with a hot glass rod dipped in the molten mass; the mass for this purpose should be a good deal hotter than for making the capsules. The hot rod just melts the edges of the material and the small quantity of the gelatin mixture that is left behind by it makes a stopper which, on cooling, is continuous within the walls. A brush is sometimes used instead of a glass rod; this carries more of the molten mass, but is not so effective in melting the edges of the opening.

Aqueous or alcoholic liquids tend to soften the capsule and such liquid should be concentrated and mixed with almond oil or liquid paraffin before being placed in the capsules. Liquid extracts are generally evaporated so that a 0.6 ml. (10 m.) capsule represents 2 ml. (30 m.) of the normal extract. Soft aqueous extracts or masses should similarly be incorporated with a little soft paraffin. Liquids such as creosote, guaiacol, oils of cinnamon and clove, etc., which may cause discomfort in the stomach if enclosed undiluted in capsules, should be mixed with four

times their volume of almond or olive oil. Solids such as quinine sulphate and ammonium bicarbonate should be powdered and mixed separately with a basis of liquid and soft paraffins.

Hard Capsules. The capsules are made of hardened gelatin and are in two parts, the top or cap fitting over the lower and longer part. They are made in various sizes, holding from about 1 grain to 20 grains, and are suitable for powders, soft extracts, pill masses, electuaries, etc. Special shapes are made for rectal and vaginal administration, and larger sizes for veterinary use. They can be quickly filled with powder by pressing the lower half into the bulk until the weight is obtained. In the case of pills, these should be cut on the machine and then pressed into the capsule. It is sometimes quicker and more convenient to make the powder or extract into a soft pill mass, cut into equal portions on a pill machine, and insert in the capsule. The capsules may be rendered air-tight by slightly damping the edges of the cap before closing.

Enteric Capsules. Hard or soft gelatin capsules containing such substances as pancreatin or extract of male fern are required to pass through the stomach undissolved and to dissolve in the intestines. For this purpose they should, after filling and sealing, be immersed for five minutes in solution of formaldehyde diluted with three times its volume of water, and afterwards dried. Such capsules are known as glutoid capsules. The action of formaldehyde on the gelatin in the base varies with the time of immersion and the amount of gelatin in the base; the solubility of the finished capsules may be tested by treatment with suitable reagents. Capsules which dissolve in an aqueous solution of glycerin of pepsin and hydrochloric acid, when maintained with the reagent at 37° for 2 hours will probably dissolve in the stomach, whereas capsules which dissolve within 2 hours at 37° in an aqueous solution of sodium bicarbonate containing pancreatin, may dissolve readily in the duodenum. Variation in the composition of the capsule-mass influences greatly the effect of the reagents, and the strengths of the latter, therefore, require adjustment for different masses.

COMPRESSED TABLETS

Although a considerable proportion of the tablets sold are manufactured in large quantities by power-driven machinery, the preparation of medicines in this form belongs legitimately to the province of dispensing. The tablet is, in some respects, intermediate between the powder and the pill. If, for instance, barbitone is ordered in tablets, the drug is required within a very short time after administration to be in the same condition in the stomach as if it had been swallowed in a cachet; the tablet form is employed in this case chiefly because of its compactness and portability, and possibly because some patients prefer taking a tablet. The tablet here approximates very closely to a form of powder, and the principal requirement is that it will disintegrate very readily. In other cases tablets are ordered containing extracts, etc., which are usually made into pills, and the chief difference between such tablets and pills is that of shape, though it is sometimes possible to

ensure more rapid disintegration in the stomach when some substances are made into tablets instead of pills. In addition to the special requirements in these different cases, perfect uniformity of the material, the greatest possible uniformity in the weight of the individual tablets, and the best possible appearance and "finish" are essential qualities in tablet-making.

The Tablet Machine. Whilst there are a number of varying patterns of tablet machines for dispensing, they all have the following parts:—(1) An upper and lower punch, usually of steel, between which the material is compressed into a tablet; (2) a die, or small cylinder of steel bored with a hole of just large enough diameter for the punches to move freely in it; this die is the measure in which the exact amount of material for one tablet is measured, and is also the chamber in which the actual compression takes place; (3) a feeder, consisting of a hopper in which the material is placed, and by which it is supplied to the die. By a simple arrangement the foot of the hopper is made to push aside the tablet made at the previous stroke, before giving a fresh supply of material for the next. The force of the stroke in a hand machine is sometimes given directly by forcing down a lever, in others indirectly by giving another lever a to-and-fro motion; the latter plan is better calculated to secure uniformity of pressure, and therefore of hardness in the products.

With a little practice, regularity in working the machine is easily attained, and most of the skill in tablet-making is required in preparing the material for compression, most of the differences between good and bad tablets being due to differences in the preparation before compressing. We will first consider the requirements which are common to all materials, before discussing special difficulties.

Condition of the Material. The machine is adjusted for producing tablets of different weights by the use of dies (and punches) of suitable diameter, and also by raising or lowering the lower punch in the die, until the latter, when filled to the top by the feeder, holds exactly the weight of material required in one tablet. These adjustments having been made, the weights of the individual tablets in a batch will depend on the particles of the material in the hopper being uniform in size, and in such a condition that they will run easily through the opening in the foot of the hopper. Fine powders will not run easily and must not be used; a granular powder, the particles of which will just about pass a No. 16 brass sieve, is usually the best. If there is much finer powder with the granules, it will sift to the bottom of the hopper with the vibration, and since it will lie closer than the coarser granules, the tablets produced at first will weigh considerably more than those which follow. If, on the other hand, the granules are too coarse, the quantity that fills the die will vary from time to time and some of the tablets will be too light.

Preparation of the Granules. In the simplest cases all that is necessary for producing satisfactory granules is to powder the material coarsely. Potassium bromide may be taken as an example of the substances that can be dealt with in this way; the salt is rubbed down in a mortar and shaken through a sieve of No. 16 mesh; the coarser pieces which do not pass the sieve are again rubbed down; the whole

DISPENSING

should be transferred to the sieve at short intervals, so that the particles which are small enough to pass will not be crushed still smaller. It is inevitable, however, that some finer powder should be produced, and when all the salt has passed the No. 16 sieve it must be put into a rather finer one, about No. 30 being best, and all that will pass this finer sieve is rejected. This can, of course, be used for other dispensing purposes. The remainder will now be in very nearly uniform particles; if not perfectly dry, as is probable owing to traces of moisture being enclosed in the original large crystals, it should be dried for a short time and is then ready for compressing without further addition or treatment; the granules will run easily, and the amount that fills the die each time will be practically constant. Many soluble salts, though not all, can be prepared in a similar way. It is now possible to obtain aspirin in the form of heavy crystals which are quite suitable for use as tablet granules without further preparation and dry extract of cascara B.P. can be obtained in a suitable condition for tablet making.

When dealing with a soluble substance it is not usually necessary to add substances to assist in disintegrating it, and it is undesirable to add anything which will prevent its forming a bright solution. But many of the substances most frequently ordered in tablets, such as aspirin, phenacetin, etc., are not soluble in aqueous liquids, and if compressed alone would form tablets that would only be very slowly absorbed after swallowing; it is therefore necessary to add a substance such as starch to assist disintegration. Potato starch and arrowroot starch are more efficient than other kinds, and one of these should always be employed. The amount that is necessary varies somewhat in different cases and is usually from 5 to 10 per cent; if any addition is to be made it is best to add enough to ensure the object in view, and half a grain of starch in a five-grain tablet, or even one grain, if necessary, may be used. Phenacetin and similar materials must be finely powdered first and the starch then added; the powder must then be moistened, and various liquids are suitable for this purpose in different cases, the principal being water, spirit, or very weak solutions of sugar, gum, or dextrin. Many substances can be granulated quite well with plain water or spirit, and when an adhesive substance like dextrin is required, the smallest possible quantity should be used. All that is required is to prevent the granules from falling to powder after drying, when transferred from vessel to vessel or subjected to the vibration of the hopper of the machine. Having damped the powder with sufficient of the liquid which experience has shown to be best to give it a clinging character, it is gently passed through a No. 16 sieve, when it will come through in the form of small moist granules; it is then spread out in a thin layer to dry, in a fairly warm place. When dry, it may with advantage be passed through a No. 16 sieve again to break down any aggregations into larger masses. In order that it may run easily, a lubricant must now be added. Finely powdered French chalk (talc) is most frequently employed, and from 1 to 3 per cent. is usually required; this is scattered over the granules in a thin layer and the whole then gently shaken in a dry bottle or other vessel. The material is then ready for compression.

Other lubricants besides French chalk may be used for the granules; if the material of the tablets is soluble in water, it is not desirable to add

an insoluble substance, and boric acid can then generally be employed in place of the talc. Pure liquid paraffin can also be used, this being sprayed on to the granules with a fine spray; in other cases a solution of white soft paraffin in ether is preferred, the granules being then exposed to the air after spraying until all the ether has evaporated. Oil of theobroma is also very useful, and a convenient method involving its use has been devised, by which the lubricating and granulating are done in one operation. An emulsion of oil of theobroma is prepared by the aid of soap and a little tragacanth (or acacia and tragacanth for cases where soap would be objectionable), and the powder for compression is moistened with this emulsion and passed through a No. 20 sieve. The granules so formed are dried by exposure to the air, after which they are ready for compression without further lubrication. When the material to be compressed is of such a nature that it would become unduly sticky when moistened with an aqueous liquid, a solution of oil of theobroma in ether and alcohol may be used in place of the emulsion; this has the further advantage that the granules dry more rapidly, and it is on that account more suitable in dispensing. This method is only of value for making small quantities of tablets and on occasions when they are required very quickly. Usually even at the dispensing counter, it is better to use the general method as the oil of theobroma is liable to become rancid on storage.

Many formulæ which are prescribed in the form of tablets could equally well be dispensed as pills; in these cases rapid disintegration of the tablet is not, as a rule, required, but it would be a great mistake to suppose that a pill mass should be prepared, and then dried and compressed. In making a pill mass, a considerable degree of cohesion is required to permit of rolling, cutting, rounding, etc., and this has to be attained by the use of a fair amount of moisture with some sticky substance, such as an extract. But the pressure exerted in making a tablet is so great that an apparently perfectly dry powder, if it contains an extract, is at once made perfectly coherent. In preparing the material for compression, therefore, only the least possible amount of moisture is to be added. Extracts should be dried and powdered, either alone or with some drying powder; all the ingredients should be finely powdered and mixed, then just moistened with a suitable liquid, and granulated, and the granules dried, lubricated, and compressed as already described. In the following example:—

R Aloini	gr. ℥.
Strych.	gr. iss.
Ext. Bellad.	gr. xij.
Excip. q.s.	ad gr. C.
M. Ft. pil. vel tabell. 100.	

if pills are to be made, the $66\frac{1}{2}$ grains of excipient would be about 30 grains of powdered liquorice, and the remainder some other binding material. But if tablets are desired, the whole $66\frac{1}{2}$ grains should be lactose; after thorough mixing enough water is added to make the powder just moist, when it is passed through a sieve, forming granules which are dried and lubricated and are then ready for the machine.

Two general rules may be mentioned, due observance of which will go far to enable even the beginner to produce tablets with a proper finish. These are:—

(1) Do not compress granules that are not properly dried; slightly moist granules are prone to stick to the punches and are difficult to feed from the hopper.

(2) Remember that it is impossible to produce tablets with a good finish if the surfaces of the punches are at all rough; it is not only necessary to clean and dry them thoroughly after each using, but they should be well polished with the finest emery at short intervals.

EFFERVESCENT GRANULES

These are made by mixing the medicament, dried if necessary, with sodium bicarbonate, tartaric acid, and citric acid, then granulating the resulting mixture by stirring in an evaporating dish or pan heated to between 95° and 105° , passing through sieves of suitable size, usually from numbers 5 to 10, and drying at a temperature not exceeding 55° . Roughly, the proportions of sodium bicarbonate, tartaric and citric acids might be taken as 3 : 2 : 1, and when sweetened one-half to one part of sugar should be added to these proportions.

A definite quantity of the medicament should be contained in 60 grains of the granules, which should be preserved in glass-stoppered or tightly corked bottles. For other suitable formulæ see the British Pharmaceutical Codex.

PASTILLES

It is sometimes required to administer certain medicines in such a way that their action will be exerted locally on the throat. This can of course be done in some cases by making them into a gargle, but the method more frequently adopted is to employ a pastille, in which the required medicament is combined with a slowly soluble basis. The basis of pastilles is a stiff mass of gelatin with glycerin, which is commonly known as glycogelatin. A suitable formula for this will be found in the British Pharmaceutical Codex, but the following simpler formula is from the Pharmacopœia of the Throat Hospital:—

Gelatin	1 oz.
Glycerin (by weight)	$2\frac{1}{2}$ oz.
Solution of Carmine, a sufficiency.	
Orange-flower Water	$2\frac{1}{2}$ fl. oz.

Soak the gelatin in the water for two hours, then dissolve on a water-bath, add the glycerin and mix, and add the colouring when partly cooled.

Other flavouring agents may, of course, be used. When required in dispensing, the proper quantity of this mass is weighed out and melted by the heat of a water-bath and the medicament incorporated with it. If the latter is a soluble substance—as, for instance, cocaine hydrochloride—it can be dissolved in the basis and evenly distributed by stirring. If it is not soluble it can be rubbed to a smooth mixture with a little glycerin or water and stirred in. The mass is then poured out into a suitable tray, which may usually be extemporised, if necessary, from the lid of a tin, and allowed to set. When cold, it is taken out and cut into the correct number of equal portions with scissors; or separate moulds may be used and each pastille cast separately, in which case care must be taken to fill all the moulds equally, or the products will contain variable doses of the medicament.

CONFECTIONS

No gelatin is employed in making confections or electuaries, consequently the mixture does not set to a solid but remains in the condition of a paste, which is supplied to the patient in bulk. Of the official representatives of this class of preparations, Confection of Senna is mostly prepared on the manufacturing scale. Confection of sulphur is fairly representative of the preparations of this kind which are made at the dispensing counter and there are no special difficulties in their production. It is, of course, important that only fine powders should be employed and that these should be well mixed before adding the liquid ingredients, the whole being then well triturated together.

PASTES AND JELLIES

Pastes are medicated preparations intended for external application. They are usually compounded with a basis of soft paraffin, liquid paraffin, starch and glycerin or water, bassorin paste, or gelatin and glycerin. They are employed principally as antiseptic, caustic, cooling or soothing dressings in skin affections, and are usually applied with the brush or spread on lint, covered with a layer of absorbent cotton wool, and secured by a bandage or strapping plaster. Pastes prepared with a gelatin and glycerin basis are melted by standing the containers in hot water, and applied to the skin with a brush, the film produced being covered with lint or other suitable protective. Gelatin and glycerin pastes are usually medicated with substances possessing antiseptic or soothing properties, and the medicated films produced by their application are frequently employed for protection and relief in dermatology. Bassorin paste (*Linimentum Exsicicans*) consists of tragacanth, 5 parts; alcohol (90 per cent.), 10 parts; glycerin, 2 parts; distilled water, to 100 parts. This basis is sometimes used medicated with ichthammol (30 per cent.), boric acid (10 per cent.), chrysarobin (5 per cent.), betanaphthol (5 per cent.), resorcinol (30 per cent.), or salicylic acid (5 per cent.). When such preparations are smeared upon the skin and allowed to dry, a medicated film is produced, which can easily be removed by washing.

OINTMENTS

Although in the case of any external application no question of uniform division into doses can arise, it is not less important that the active ingredient or ingredients should be uniformly distributed throughout the whole. It is also of importance that the medicament should be presented in an unaltered condition, any undesirable chemical decomposition being guarded against with as much care as in making a mixture for internal use. Since, however, the basis of an ointment is not nearly so favourable a vehicle for chemical reaction as a liquid in which two substances are dissolved, there is much less likelihood of incompatible substances being brought into reaction, and ointments do not, therefore, present many difficulties due to the occurrence of chemical changes. Ointments may be divided into two classes, (a) those which are medicated and (b) those which contain no medicaments but are required merely for their soothing emollient properties.

Properties of Ointment Bases. The bases for medicated ointments may be readily absorbed by the skin or relatively unabsorbed. This is considered to have an effect upon the rate at which a medicament may pass through the skin and be absorbed into the blood stream. In the case of certain medicaments such as phenol, boric acid, zinc oxide, chrysarobin, a local surface action is desired, and therefore a poorly-absorbed base is used, such as one or more of the paraffins. Some medicaments, on the other hand, must pass into the blood stream if they are to exert their action, *e.g.*, iodine, mercury, atropine and belladonna preparations. For these an absorbable base such as lard, wool wax or wool fat is used. The student should know the general properties of the main ointment bases, which may be summarised as follows:—

LARD. The purified fat of the hog.

- (1) It is readily absorbed by the skin.
- (2) It readily goes rancid, developing acidity and an unpleasant odour and becoming irritating to use. The rancidity may be prevented by benzoinating, forming benzoinated lard (B.P.).
- (3) It is liable to react with certain medicaments. Thus iodine is absorbed by lard. Rancid lard will liberate iodine from potassium iodide.
- (4) Its melting-point may be lowered if it is overheated. It is therefore important to use the minimum amount of heat when melting, otherwise in hot weather considerable difficulty may be experienced in getting the ointment to set hard. Moreover lard is a mixture, and when the melted lard is cooling, it may separate into a lower solid layer and an upper very soft layer. It is important, therefore, to stir lard continuously whilst it is cooling.
- (5) It will not take up or emulsify much water and is not, therefore, a good base to use when much aqueous liquid has to be incorporated.
- (6) Phenol readily dissolves in lard and then may readily pass through the skin, giving rise to symptoms of phenolic poisoning.

PARAFFIN BASES consist of soft paraffin, or a mixture of hard and soft paraffins, or paraffin ointment.

- (1) They are absorbed slowly by the skin.
- (2) They do not go rancid.
- (3) They do not react with medicaments.
- (4) Their melting-points are not seriously affected by overheating.
- (5) They will not take up very much water.
- (6) Their consistence may be altered or adjusted by varying the quantities of hard and soft paraffins. This is a very useful property, particularly when oils such as eucalyptus, etc., have to be incorporated.

WOOL FAT. The natural fat in sheep's wool.

- (1) It is readily absorbed by the skin.
- (2) It does not go rancid over a long period.
- (3) It does not react with medicaments.

- (4) Its melting-point is not seriously affected by overheating.
- (5) It readily takes up and emulsifies water or aqueous solutions. It is a good emulgent for water-in-oil emulsions and may be used whenever an aqueous liquid has to be incorporated in an ointment.
- (6) It is too sticky for use by itself and is therefore usually diluted with other bases such as soft paraffin.

SIMPLE OINTMENT, B.P. This is a mixture of wool fat and hard and soft paraffins. Because it contains wool fat, it is capable of emulsifying aqueous liquids. It does not go rancid and is probably absorbed better than a paraffin base.

ointment of Wool Alcohols. This ointment base has been introduced by the Sixth Addendum to the B.P. 1932 and consists of a mixture of wool alcohols, hard paraffin, soft paraffin and liquid paraffin. It is capable of absorbing an equal weight of an aqueous liquid forming a water-in-oil emulsion and is used in certain of the official ointments for this purpose.

Hydrous Ointment. This is an aqueous ointment base included in the Sixth Addendum to the B.P. 1932 which has replaced simple ointment in many of the official ointments. It is more readily absorbed by the skin than simple ointment.

Emulsifying Bases. These are ointment bases containing emulgents of the sulphated fatty alcohol types. A suitable base may be prepared by melting together equal parts by weight of the sulphated fatty alcohol compound, soft paraffin and liquid paraffin. Aqueous liquids may be incorporated by triturating in a mortar, adding the liquid in small quantities at a time. By varying the proportions of base and water used, any degree of stiffness may be obtained from a moderately stiff ointment to a cream. The emulsions formed are of the oil-in-water type and undue concentrations of electrolytes should be avoided in formulae employing these bases. Ointments and creams of this type are very penetrative but lack the surface-greasing effect of bases consisting wholly or mainly of paraffins.

Preparation of Ointments. Ointments requiring levigation can be made either in a mortar, using a flat-headed pestle to ensure good shearing, or on a slab using a flexible metal spatula. A stainless steel, flexible spatula which makes surface contact with the slab and provides a good shearing action should be used.

When a medicament has to be incorporated in a base it may be either

- (a) Dissolved in the base if soluble;
- (b) Dissolved in a solvent such as water or alcohol and the solution incorporated or emulsified in the base; or
- (c) Finely powdered and then mixed with the base.

The following rules apply to the preparation of ointments:—

- (a) If the base consists of several ingredients, fats, waxes, etc., melt the one with the highest melting-point first, using the minimum amount of heat, then add the others in the order of decreasing melting-points. By this method the minimum amount of heat will be used and melting-points least affected. Always utilise a water-bath and never the direct heat of a flame.

- (b) If the base requires straining, melt it and pass it through lint or coarse filter paper. This is usually done for eye ointments.
- (c) If the medicaments are soluble, *e.g.*, phenol, chrysarobin, camphor, etc., dissolve them in the base using the minimum amount of heat. The following is another example of an ointment where the medicament is soluble in the base:—

R Atrop.	1.0
Paraff Moll.	99.0

Care must be taken that the quantity dissolved will not tend to crystallise out on cooling as this may cause much irritation when the ointment is applied.

- (d) If a very small quantity of a water-soluble medicament has to be incorporated, such as may be the case with mercuric chloride, it is best to dissolve it in a little water and incorporate the solution in the base.
- (e) Aqueous extracts and alcoholic extracts may be rubbed quite smooth with water or alcohol respectively and the liquid produced emulsified in the base.
- (f) If the medicament is insoluble it should be finely powdered, then well levigated with a small quantity of the base until no small particles are visible, and finally be mixed with the remainder of the base. Good levigation is very essential as it adds to the effectiveness of the ointment and poorly-levigated ingredients may cause irritation. Glycerin is often a useful ingredient for assisting levigation or for dissolving the medicament and preventing crystallisation.
- (g) If much aqueous liquid has to be incorporated in an ointment, the basis should contain an emulsifying agent such as wax, wool fat or wool alcohols. It occasionally happens that a prescriber orders a larger quantity of a liquid than the prescribed basis will emulsify. In such cases a small portion of the basis should be replaced with an equal weight of wool fat.
- (h) Ordinary steel spatulas may react with certain medicaments such as salicylic acid, tannic acid, iodine, etc., especially in the presence of water, and this may result in discoloration of the ointment. Vegetable extracts very frequently contain tannin and such extracts may be darkened if manipulated with a steel spatula. Stainless steel, however, may be employed and rarely gives trouble.

Ointments in Collapsible Tubes. Ointments are frequently ordered to be dispensed in collapsible tubes. This is by far the best type of container and should be employed whenever possible. The tubes may be filled by slightly warming the ointment and filling the tube to about $\frac{3}{4}$ of its capacity. If this is not possible or desirable owing to the nature of the ingredients, place the ointment on a piece of white dandy or strong grease-proof paper somewhat longer than the tube and roll into a cylindrical form and insert in the tube; now close the tube by gently pressing with a spatula about an inch from the open end, at the same time gently withdrawing the paper, leaving the ointment in the tube, which is now closed by folding the flattened end two or three times on itself. It is desirable that the ointment should be soft

enough to press out easily. Collapsible tubes are made with special nozzles suitable for the application of the ointment to the eye, nose, or rectum.

Ointments for the Eye. Ointments for the eye, or Oculenta, require special care in preparation. The basis should be filtered through paper to remove all foreign matter and then sterilised. During the preparation of the ointment reasonable aseptic precautions should be taken, including (a) the use of sterile apparatus, (b) the use of a dust screen, and (c) packing the ointment in sterile collapsible tubes.

The Pharmacopœia directs that when the medicament is soluble in water, it should be dissolved in the minimum amount and emulsified in the basis. The base consists of yellow soft paraffin with 10 per cent. of wool fat which ensures good emulsification of the solution. Ointments containing alkaloidal salts, such as atropine eye ointment, are prepared in this manner. The free alkaloids, however, are usually not soluble in water, in which case they are either dissolved in the basis or finely powdered and incorporated by thorough levigation.

Yellow mercuric oxide eye ointment requires special care to ensure good levigation, as particles of the oxide may be irritating.

The preparation of these ointments should be done preferably in a sterile mortar under a dust screen. The product should be poured into the sterile collapsible tubes which may be surrounded with cold or iced water. Special care should be taken when insoluble medicaments are in suspension to pour at the minimum temperature so that the fluid ointment may be viscous enough to keep the medicament in suspension.

SUPPOSITORIES, BOUGIES AND PESSARIES

Suppositories are intended for introduction into the rectum, bougies into the urethra, nose or ear, and pessaries into the vagina. For all these forms of administering medicines the requirements are, first, the uniform distribution of the active ingredients throughout the mass; second, sufficiently accurate division into doses; and, third, the use of a vehicle which will give sufficient hardness to permit of the suppository, etc., being easily introduced, but which will liquefy wholly or in great part at the temperature of the body and so set free the medicament when in contact with the mucous membrane of the rectum, vagina, urethra, or nose, as the case may be, without itself causing irritation. The bases commonly employed are oil of theobroma (cocoa butter), glycerin suppository mass, and stiff jelly made from glycerin, gelatin and water.

The Moulds. The method which is commonly employed in making suppositories is that of casting by pouring the material in a molten state into moulds in which it solidifies. On removing the products from the moulds they should require little or no further treatment, and the appearance of the finished suppositories is considerably affected by the condition of the moulds. Suppositories and pessaries are usually cone-shaped. Torpedo-shaped suppositories are also frequently used. For urethral bougies the shape is that of a cylinder of even diameter, or tapering very slightly to one end and then more rapidly to a blunt point; while for nasal bougies the shape is intermediate between those of the urethral bougie and the suppository. For the ordinary sizes, gun-metal moulds for six or twelve are usually employed; the mould is made

in two pieces held together by a screw and separated when the material has solidified thoroughly in order to remove the suppositories, etc. The two parts of the mould are usually made to separate in the plane containing the long axis of the suppositories. This pattern is to be preferred, chiefly for the reason that it lends itself to thorough cleaning of the mould after use. If the interior surface of the moulds is rough, the probability of the suppositories sticking and being broken in removing is considerable, even when a lubricant is employed on the mould before filling; but if the surface is perfectly smooth the suppositories can usually be taken out easily. The moulds are best silver-plated, the plating being renewed as often as necessary.

Many suppositories are better made by what is known as the cold process—that is, instead of being melted and poured into the moulds, the material is introduced in the form of a coarse powder or a somewhat plastic mass, which is then forced to take the shape of the mould and to cohere by the application of pressure. For this method, the moulds are usually arranged so that each in turn can be brought under a tube of the same diameter as the base of the required suppositories, in which is a plunger or piston for the application of the necessary pressure.

Before a mould is actually employed for making medicated suppositories, its true capacity should be ascertained by making a batch of plain cocoa butter suppositories in it and then weighing them; if each space holds a little more than fifteen grains it is of no consequence, provided that proper allowance is always made for the capacity of the moulds in weighing out the cocoa butter to be used in any given case. The exact quantity to be taken will, of course, depend on the amount of medicament; if this amounts to one grain or less, an equal weight of cocoa butter may be deducted from the total capacity of the mould; but if larger quantities of medicament are to be employed, a correction must be made for the amount of cocoa butter displaced by the medicament according to the density of the medicament. Experience will soon teach a dispenser what allowance to make for each of the drugs ordinarily prescribed in this form. In case of any uncertainty, the best plan is to weigh out the amount of the drug for one suppository, mix it with three or four grains of melted cocoa butter, and put the whole into a mould and then fill up with more of the melted fat. When cold this trial suppository is taken out and weighed, and the correct amount of cocoa butter to be employed for the batch is then readily ascertained.

The Basis, or Vehicle. When oil of theobroma is used as a basis it is important to remember that only the minimum amount of heat should be used to melt it. Over-heating will cause a lowering of the melting-point and may cause great difficulty in solidifying. Instead of actually liquefying the base it is far better to heat gently and puddle the basis until it has the consistence of very soft butter; it should be mixed with the medicament in this condition. Certain medicaments such as phenol or chloral hydrate may lower the melting-point of oil of theobroma, in which case it may be necessary to use from one to three grains of white wax for each fifteen grain suppository. If, however, the above temperature precautions are carefully observed so that the temperature on admixture of medicament and basis is as low as possible, no wax is necessary.

Various other materials have been proposed for general use as a basis, the chief being coconut stearin, and a mixture of stearic and oleic acids; they do not, however, possess any advantage over cocoa butter and they have not been adopted to any considerable extent. For certain medicaments a non-fatty basis is best and a jelly composed of glycerin and gelatin is then employed. Glycerin itself is often required in the form of a suppository for the relief of constipation. It may be made into a stiff jelly with gelatin, as in the official formula for glycerin suppositories which contains 70 per cent. of glycerin, or a mass may be made by the aid of sodium stearate, when as much as 95 per cent. of glycerin in the suppository can be attained. Glycerin suppositories made with sodium stearate are very hygroscopic and each should be wrapped separately in tin-foil or waxed-paper; this precaution is less necessary for those made with gelatin. When a jelly is required merely to act as the basis for a medicament, and the local therapeutic effect of the glycerin is not required, it should be made with a much smaller proportion of glycerin than the official suppository. The following is a suitable composition:—

Gelatin	10 parts
Water	40 parts
Soak, then dissolve with the aid of heat; add	
Glycerin	15 parts
and evaporate on a water-bath until all the water is driven off—that is, until the whole weighs 25 parts.	

Substances soluble in water, if ordered in quantities that cannot be made into a homogeneous mixture with cocoa butter, can be dissolved and mixed with the melted gelatin base. The proportions of gelatin and glycerin can be varied according to the purpose for which the mass is required, and in some cases it is best not to evaporate off the whole of the water thus obtaining a softer mass.

Lubrication of the Mould. When the surfaces of the mould are in very good condition, lubrication of the mould is often unnecessary; in many cases, however, it is best to apply a mixture of soap liniment one part, glycerin three parts, with a camel-hair brush, and then turn the mould upside down until the mass is quite ready to pour in, so that as much as possible of the lubricant drains out. If, however, the gelatin base is to be employed the best lubricant is almond oil, of which a minute quantity is applied by wiping out the mould with the slightly oiled corner of a cloth. Before filling, the mould should be moderately but not extremely cold.

Preparation of the Mass. The quantity of each ingredient to be taken should be enough for one more than the required number of suppositories; this allows for the small quantity that always remains in the dish, and for the trimming of the bases of the suppositories. Soften the cocoa butter by gently heating in a small dish on a water-bath, not allowing its temperature to rise much above melting-point; finely powder any dry ingredient, and rub an extract with sufficient water or alcohol (according as it is an aqueous or alcoholic extract) to make it thin and smooth. Mix a small quantity of the melted basis with the other ingredient or ingredients on a slab with a spatula until smooth and homogeneous; then transfer this mixture to the dish containing the rest of the fat, stir until thoroughly mixed, and pour into moulds; the whole mass should be only warm enough to be just fluid

when poured. This precaution is very necessary when heavy medicaments are suspended as these would fall to the bottom if the mass were too fluid and an even distribution in each suppository would not be attained. Each mould must be slightly overfilled to allow for the contraction that occurs in the cooling and setting. When the suppositories have just set, put the mould on ice and leave it there for some time, until they are quite hard. It is best not to put it on ice until the mass has solidified, or it contracts and sets so quickly that a small cavity may form down the middle of each suppository. After cooling, scrape off with a knife all the mass which projects above the level of the edges of the moulds. Upon unscrewing the mould, the suppositories should be readily detached. If too much lubricant was left on the moulds, wipe the surface of the suppositories gently with a cloth. In cases where the medicament is soluble in the melted base, it may, of course, be added directly to the latter in the dish. When the gelatin base is used the drug is generally one that is soluble in water; it is then dissolved in the smallest quantity possible of the latter and the solution added to the melted base in the dish. Heating is then continued further or not, according as a stiffer or a softer suppository is required. In pouring suppositories prepared with a gelatin base, the moulds are filled exactly as it is not possible in this case to scrape off any surplus with a knife.

Suppositories are generally prepared in moulds holding 1 gramme (15 grains) or 2 grammes (30 grains) of oil of theobroma. Unless otherwise specified a 1-gramme mould should be employed. A 1-gramme mould will hold about 1.2 grammes (18 grains) of glycerin suppository mass.

Bougies. Bougies are medicated pencils specially adapted for the application of medicaments to the urethra, the nostrils or the ears. They may be moulded like suppositories but differ in shape, resembling a pointed rod. The basis is either oil of theobroma, or gelato-glycerin, which may be prepared by dissolving gelatin $3\frac{1}{2}$ ounces in a mixture of glycerin 4 fluid ounces and distilled water 4 fluid ounces, the whole being evaporated on a water-bath to 10 ounces.

URETHRAL BOUGIES may have either a gelato-glycerin or oil of theobroma basis and may be of any length up to 6 inches. Usually they are $2\frac{1}{2}$ inches (15 grains in weight) or 5 inches (40 grains) and have about the diameter of a No. 8 or No. 9 catheter respectively. When the size is not specified, the smaller size should be supplied. The oil of theobroma may be replaced by one of the following mixtures:—

(a) Oil of theobroma 90 parts, wool fat 10 parts.

(b) Oil of theobroma 50 parts, hydrous wool fat 25 parts, white wax 25 parts.

NASAL BOUGIES resemble urethral bougies in shape but are 3 inches in length and weigh about 18 grains. They are usually made with a gelato-glycerin basis.

AURAL BOUGIES are shaped like other bougies but are about 1 inch in length and weigh about 6 grains. Unless otherwise ordered they are made with a gelato-glycerin basis.

PESSARIES are moulded like suppositories. Unless otherwise specified, oil of theobroma should be used as the basis. The moulds used should

have a capacity of 120 grains of oil of theobroma unless otherwise ordered, the exceptions being pessaries of lactic acid and of quinine hydrochloride for which 30-grain moulds should be used.

TAMPONS

Originally tampons were used as plugs to stop bleeding, but that use has now been extended and they are now used, either medicated or unmedicated, for a variety of purposes.

Nasal tampons are prepared from sterilised absorbent cotton wool encased in gauze, then compressed. When moist the compressed wool expands and the tampons may thus be used to control intra-nasal hæmorrhage or merely to absorb nasal discharge.

Vaginal or uterine tampons may be prepared from small sponges which have been sterilised and threaded on a narrow tape or silk cord to facilitate withdrawal after use, or, as in the case of the nasal tampons, they may be prepared from sterilised absorbent cotton wool encased in gauze with a withdrawing cord attached. Both the sponges and the cotton wool tampons should be approximately $1\frac{1}{2}$ inches in diameter.

When medicated tampons are required the medicament is dissolved or suspended in glycerin and the tampon saturated with this. The medicaments mostly in demand are ichthammol and mild silver proteinate, and the strengths usually required are:—

Mild Silver Proteinate	1, 5, and 10 per cent.
Ichthammol	5, 10, and 20 per cent.

There is also a certain demand for tampons saturated with unmedicated glycerin.

Much more elegant products are prepared by using large sized hard gelatin capsules. The medicament is added to glyco-gelatin suppository base and 120 grains introduced into the larger part of the capsule, exactly as would be done when making a glyco-gelatin base suppository or pessary. The necessary plug of gauze-encased wool with cord attached is then inserted into the remaining space in the hard gelatin container, when the tampon is ready for use.

It should be borne in mind that glyco-gelatin base when combined with ichthammol tends to become more and more insoluble with age, so that pessaries and tampons of this combination should be prepared as required.

PLASTERS AND BLISTERS

The use of plasters as a means of applying drugs externally has now been largely discontinued, but occasionally the pharmacist may be required to spread a plaster and the student should be familiar with the methods employed. The material employed as the support for the layer of plaster mass is a rather thin white leather, usually known as plaster skin which usually requires to be smoothed by pressing with a hot iron before the plaster is spread, or strong calico. A "shape" for the plaster is cut out of paper by marking with a pencil the exact size and shape that is to be occupied by the medicated surface, folding the paper and cutting this out with scissors; a second cut outside the first and distant by about an inch leaves a strip of paper about an inch wide, surrounding a space of the required dimensions. This strip

of paper, or "shape," is next soaked in water for a few minutes, then spread out evenly on the skin and pressed down with a cloth, when it will adhere lightly; the plaster mass can now be spread on the area of the skin so surrounded, overlapping slightly on to the paper; on subsequently removing the latter a clean edge is left. If the "shape" is painted with a little flour paste it adheres firmly, and when stripped off it leaves a clean and clear margin. The amount of plaster mass to be spread is cut from the roll, allowing about 10 or 15 grains to the square inch; the plaster spatula is heated in a Bunsen flame, taking care that it does not become hot enough to burn the material, or a gas-heated plaster "iron" may be used instead; the plaster mass is melted in a porcelain dish, or by means of the hot spatula or "iron" on a piece of brown paper. When it is thin enough in consistency it is quickly transferred to the base cloth or skin and spread evenly over the latter by a few firm strokes; it is best to move the spatula from left to right only, turning the skin round if it is necessary to move any of the mass the other way. The evenness with which the plaster is spread depends principally on keeping an even pressure on the spatula, and actual practice is the only means by which skill can be obtained in this manipulation. When the spread mass has set, but before it is quite cold, the paper shape is torn through and gently pulled off; the skin is then cut, so as to leave a margin of three-quarters to one inch all round the actual plaster.

Blisters are made by spreading cantharidin plaster, not on skin, but on ordinary adhesive plaster; in this case no heat is employed beyond a warm spatula. A paper shape is cut as described above, but instead of merely wetting it, it is soaped on one side and pressed down on the plaster. A sufficiency of the cantharidin plaster is then softened and spread evenly with the warm spatula, moving the latter from left to right. The shape is removed and the blister cut out, leaving a sufficient margin of adhesive plaster. The edges may be subsequently finished off by lightly passing a warm spatula over them.

The cantharides plaster of the British Pharmaceutical Codex is still sometimes ordered. In this case no heat is employed, the plaster being softened in the hand and spread evenly with the thumb. The surface and edges may be finished off with a warm spatula as before.

STERILISATION

When a preparation is intended for injection through the skin it is very important that no bacteria, particularly of pathogenic types, should be present and the container should be one which effectively prevents re-infection. Owing to the increasing practice of administering medicaments by parenteral injection, the production of sterile preparations is now an important part of pharmacy. A solution or preparation is sterile when it contains no living micro-organisms either of a bacterial or fungoid nature and sterilisation may be effected either by killing the organisms by heat treatment with or without a bactericide or by filtration through a bacterial filter. Fungi and their spores are readily killed at moderate temperatures. They are rarely pathogenic, but their presence is unsightly and may lead to some change in the preparation with inactivation of the medicament. The removal of bacteria raises

more serious problems and a knowledge of the mode of living and habits of bacteria is an essential part of the study of sterilisation. The temperatures used for sterilisation by heat must not only be sufficiently high to kill the bacteria but must also be determined by a consideration of the stability of the medicament. Antiseptics used in sterile preparations must be efficient in preventing re-infection but must also be non-toxic to the patient when injected.

In determining the conditions required for sterilisation by heat it is necessary to consider the temperature used and the length of time during which the preparation is maintained at that temperature. By increasing the duration of heating, sterility may be obtained at lower temperatures. Another factor which is of considerable importance is the presence or absence of water. Bacteria are killed at lower temperatures if water is present than if it is absent. It may be stated that all organisms, whether existing as spores or in the vegetative form, are killed if subjected to a temperature of 115° for 30 minutes in the presence of moisture, whereas in the absence of moisture, a temperature of 150° for 60 minutes is necessary.

A third factor which affects the conditions necessary for obtaining sterility depends upon the nature of the preparation. If the preparation contains substances which favour the growth of bacteria, the organisms will be present in the vegetative form which is more susceptible to heat treatment than the spore form. The pH of the preparation will also affect the condition of the organism, spores being formed in media the pH of which is adverse to the growth of organisms.

In general, pharmacopoeial solutions do not contain substances which favour the growth of bacteria and the pH is frequently unfavourable. The heat conditions necessary, therefore, must be such that spores are killed as well as the vegetative forms. The temperatures and times given above are generally necessary, but if a bactericide is present the temperature may be reduced.

Methods of Sterilisation. The Fourth Addendum to the B.P. 1932 prescribes the following processes to be used in preparing solutions and suspensions for parenteral injection:—

1. STERILISATION OF GLASS VESSELS AND CONTAINERS

Glass vessels and containers are well freed from grease and are then sterilised by heating to 150° for 1 hour, or by exposing to saturated steam in an autoclave at 115° to 116° for 30 minutes.

All apparatus should be well washed in hot soapy water and then thoroughly rinsed in tap water before placing in the oven. The mouths of flasks and bottles should be covered over with paper or they should be wrapped in paper. On no account should any rubber material be put in the oven. Collapsible tubes for eye ointments should be placed in test-tubes plugged with wool and then placed in the oven.

2. HEATING IN AN AUTOCLAVE

A solution to be sterilised by heating in an autoclave is distributed in suitable containers which are then finally sealed. When the volume in each container does not exceed 100 millilitres the containers are exposed to steam at 115° to 116° for thirty minutes. When the volume in each container exceeds 100 millilitres, the containers are exposed for a longer time, sufficient to ensure that the whole of the solution in each container is maintained at the temperature of 115° to 116° for thirty minutes.

The following procedure should be observed when using the small type of gas-heated autoclave. Water to a depth of about one inch is placed in the bottom; the materials to be sterilised (in wire cages), are then inserted, and the lid is secured, leaving open the small cock provided. Heat is applied until steam escapes freely from the open cock. The cock is then closed and the heating continued until the required temperature is reached. Autoclaves are usually fitted with pressure gauges only but it is preferable, if possible, to use one which is also fitted with a thermometer as pressure gauges are liable to become inaccurate with use. If the apparatus is fitted with an automatic gas-regulating gauge the gas supply will be reduced when the desired pressure is reached. After heating for the prescribed period the autoclave should be allowed to cool slowly and the cock should not be opened until the pressure has fallen to atmospheric pressure. This last direction is most important, for if the pressure is suddenly released solutions in containers which are not hermetically sealed, such as plugged flasks, will boil away very quickly.

If solutions are to be dispensed in ampoules these can be filled, sealed and autoclaved, thus not only ensuring the sterility of the contents, but also guaranteeing that re-infection cannot occur during storage.

The vaccine bottle sealed with a rubber cap is the most commonly used container which permits successive doses to be removed on separate occasions. Ordinary rubber vaccine caps must not be wired on to the bottle, otherwise they will burst in the autoclave. It is customary to insert a piece of wire in between the cap and bottle during heating in order to provide a vent. After heating and cooling the cap may then be securely wired on. This practice, however, is not strictly permitted by the pharmacopoeial directions. Vaccine caps of special design may be obtained, which can be wired on and will withstand autoclaving without bursting or distortion. For substances which are stable under the conditions, autoclaving is a quick and efficient method of sterilising and should be used in all cases where there are no objections to its use.

Autoclaving is the only effective method for sterilising surgical dressings. In order to secure thorough heat penetration and to dry the dressings after sterilisation, it is necessary to have a vacuum attachment to the apparatus and an outer steam jacket for preheating the dressings before the steam is applied. The dressings are placed in metal drums so perforated that a turn of the top exposes the dressings for sterilising and a further turn closes the perforations when sterilisation is complete. Air is removed by vacuum before the sterilisation process is carried out, and, after the treatment with steam, hot air is admitted slowly to dry the dressings. Saturated steam at a pressure of 20 lb. in excess of the atmospheric pressure for twenty minutes is necessary for the sterilisation of surgical dressings. The most efficient method for determining heat penetration is to place a thermo-couple in the interior of the dressings. By this means, both temperature and duration of time may be recorded on an external indicator. A less suitable method is to enclose indicator tubes containing acetanilide, terpin hydrate or benzonaphthol mixed with a suitable dye such as brilliant green. At temperatures above 100°

benzonaphthol melts and above 117° acetanilide and terpin hydrate melt, and these minimum temperatures are thus indicated, but no indication is given of the length of time for which the temperature is maintained.

STEAM PRESSURE AND TEMPERATURE TABLE

Pressure in excess of atmospheric	Temperature	
5 lb. per square inch	107.7°C.	226°F.
10 lb. per square inch	115.5°C.	240°F.
15 lb. per square inch	121.6°C.	250°F.
20 lb. per square inch	126.6°C.	260°F.
25 lb. per square inch	130.5°C.	267°F.
30 lb. per square inch	134.4°C.	274°F.

3. HEATING WITH A BACTERICIDE

To a solution or preparation to be sterilised by heating with a bactericide, chlorocresol in the proportion of 0.2 per cent. w/v, or phenylmercuric nitrate in the proportion of 0.002 per cent. w/v, is added. The solution is distributed in the final containers, which are then finally sealed. When the volume in each container does not exceed 30 millilitres the containers are heated at 98° to 100° for thirty minutes. When the volume exceeds 30 millilitres, the containers are heated for a longer time, sufficient to ensure that the whole of the solution or preparation in each container is maintained at the temperature of 98° to 100° for thirty minutes.

Solutions of drugs to be used for intravenous injection shall not be prepared by this method when a single dose of the injection is greater than 15 millilitres.

Solutions of drugs to be used for intrathecal or intracisternal injection shall not be prepared by this method.

This process is intended for the sterilisation of those substances which cannot withstand the conditions of autoclaving. It is an efficient and convenient method since it requires no elaborate apparatus and can easily be performed at the dispensing counter. Heating with a bactericide, however, is not an alternative to autoclaving and may only be used in those cases where it is specifically prescribed by the Fourth Addendum. It is unsuitable for large volumes of intravenous injections since in these cases the amount of bactericide administered with the injection would be unsafe. The method is also unsuitable for intrathecal and intracisternal injections.

4. FILTRATION

A solution to be sterilised by filtration is filtered through a sterile bacteria-proof filter. After the solution has been distributed with aseptic technique into the final sterilised containers, and these have been sealed, the solution is submitted to the Tests for Sterility and must comply with these tests.

Although filtration through a bacterial filter is applicable to solutions of all kinds, the Pharmacopœia prescribes that preparations sterilised by this means must comply with the Tests for Sterility. The two principal advantages of filtration are that sterilisation is achieved without the use of heat and bacterial spores are removed as easily as vegetative organisms.

The disadvantages of the method are that it requires considerable manipulative skill and carefully prepared working conditions. It is obvious also that an autoclave is necessary to sterilise the filter and its receiver.

Perhaps the most difficult task of all is to propose directions for sterile solutions required in an emergency, with which the dispenser has most commonly to deal. Probably the most effective method of preparation

is by means of a previously sterilised bacteria-proof filter, which can now be obtained small enough to sterilise a few millilitres of solution at a time. To a practised worker sterilisation is accomplished in a period which is measured in minutes, and if the receiver under the filter is fitted with a syphon tube, the solution can be delivered into a previously sterilised ampoule with the minimum exposure to contamination. The ampoule should then be sealed and tested for sterility. This procedure, however, demands thorough training, but nevertheless, with adequate attention to working conditions and care in the practice of filtration, the pharmacist can attain a proficiency which will enable him to produce a sterile solution whenever the occasion demands.

Several types of filters are available, being made from porous porcelain, diatomite, asbestos pads, sintered glass or collodion.

The following are suitable for pharmaceutical use:—

POROUS PORCELAIN FILTERS. Pasteur-Chamberland (L5); Doulton.

ASBESTOS PAD. Seitz (special EK type). An English equivalent of this pad is now available.

SINTERED GLASS. ("5 on 3" type).

The Seitz apparatus is of metal construction using filtering films made of compressed asbestos. The small filter with 4-cm. pads is excellent for filtering small quantities of liquid and can be most easily adapted to dispensing conditions. As small filters are usually operated under vacuum, it is necessary to make all joints and connections leakproof, and, as an additional precaution, to wrap every joint tightly with dry cotton wool. The filter and its receiver are then sterilised by heating in an autoclave at 115° for 30 minutes. In using the Seitz filter it is very necessary to ensure that the filtering films are thoroughly washed with sterile distilled water before the filter is used in order to remove any loose particles of asbestos and any soluble matter that may be present. In some cases it is essential to buffer the solution to be filtered to prevent an alteration in hydrogen ion concentration due to the action of the films. Another difficulty encountered is adsorption of the medicament by the filter pad. The first portion of the filtrate should be rejected.

Filter candles of the porcelain type should be cleaned by gently scrubbing the outside with a fine brush in a stream of running water and then forcing water through in the reverse direction to that used in filtration.

5. STERILISATION OF OILY SOLUTIONS AND SUSPENSIONS

A solution or suspension in oil is distributed in the final containers, which are then either finally sealed, or temporarily closed so as to exclude bacteria. When the volume in each container does not exceed 30 millilitres, the containers are heated at 150° for one hour. When the volume in each container exceeds 30 millilitres, the containers are heated for a longer time, sufficient to ensure that the whole of the solution or suspension in each container is maintained at 150° for one hour. Containers which have been temporarily closed are then finally sealed. When the solution or suspension cannot be submitted to this temperature without the production of physical or chemical change, the solution or suspension is prepared by aseptic methods, and oil, which has previously been heated at 150° for one hour, is used. The solution or suspension is transferred to previously sterilised containers, and these are sealed so as to exclude bacteria.

The official instructions for the sterilisation of oily solutions can be carried out by the use of a gas-heated hot-air oven. A thermostatically

controlled electric oven is very convenient where much sterilisation of oils has to be done and, as glassware can also be sterilised in an oven of this type, it is a useful piece of equipment to possess. Modern types consume very little current and are, consequently, inexpensive in use.

Emergency Method of Sterilisation. There is no longer an official emergency method of sterilisation. Instead, the Fourth Addendum to the B.P. states that in any emergency in which the methods described above or any special method described in a monograph cannot be applied, it is the duty of the dispenser to inform the prescriber that complete sterilisation cannot be attempted, and to obtain the prescriber's approval for the method to be adopted.

Tyndallisation. Tyndallisation is no longer an official process for sterilising solutions for use parenterally. The process is not wholly reliable and is not expeditious requiring, as it does, heating on three successive days. The method of heating with a bactericide is much sounder and only requires one heating lasting 30 minutes or more.

Sterilisation of Solutions of Pharmacopœial Substances. Directions are given in the Fourth Addendum to the B.P. 1932 for preparing sterilised solutions of official substances. This list is intended to replace the directions contained in the monographs of the B.P. 1932 and of the First Addendum. In a number of instances, *e.g.*, Hexobarbitonum Solubile, Suraminum, etc., the instructions are merely to dissolve the substance in the requisite amount of sterilised water, immediately before use. Although in theory, the substance to be so dissolved may contain live bacteria, since no instructions are given in the official monographs that the substances shall be manufactured in a manner to ensure their freedom from living organisms, in practice the freedom from bacteria of these drugs is probably exceptionally high, since destruction of live bacteria is not unlikely to occur during one or more of the chemical processes undergone by the drug during its manufacture. In addition these drugs are, or should be, issued by the manufacturers in hermetically sealed glass ampoules. The instruction, merely to dissolve in sterilised water immediately before use does not, therefore, carry the risk that it might appear to do at first sight. A more comprehensive list is contained in the Second Supplement to the B.P.C. 1934.

The Sixth Addendum gives special directions for the preparation of sterile sulphanilamide. The crystals are finely powdered and distributed in the final containers which are either finally or temporarily sealed. The powder is then heated at 150° for one hour or at 140° for four hours, at the end of which time the containers are closed finally so as to exclude bacteria. If the containers are closed by a non-absorbent cotton wool plug, the contents must be used within one month of sterilisation.

Dispensing of Parenteral Solutions

Solutions or preparations of drugs to be administered by injection are dispensed in containers sealed so as to exclude bacteria.

Addition of an antiseptic. When the container is sealed so as to permit the withdrawal of successive doses on different occasions, the solution or preparation of the drug contains a suitable bacteriostatic agent in such a concentration as will prevent the growth of micro-organisms.

Rubber caps used for closing such containers are made from a good quality heat-vulcanised rubber. They are boiled in several changes of water and are

then either boiled for thirty minutes, or stored for not less than forty-eight hours, in a solution containing the same bacteriostatic agent, and in the same concentration, as that used in preparing the injection.

Solutions intended for intrathecal or intracisternal injection are dispensed only in containers each of which contains a single dose.

The two types of containers in common use are the ampoule and the rubber-capped vial. Ampoules are usually filled by means of a hypodermic syringe or by means of a burette to the bottom of which a hypodermic needle is attached with rubber tubing, preferably protected by a small glass bell-shaped cover attached so as to shield both the end of the needle and the mouth of the ampoule during the filling process. A 25-ml. vial from which the bottom has been removed serves this purpose admirably. It is usual to put slightly more solution in each ampoule than the required dose so that an exact dose may be withdrawn by a syringe. It is customary to dispense 1.1 ml. in 1 ml. ampoules and 12 minims in 10 minim ampoules. After filling, the ampoules are sealed and, wherever possible, sterilised by heat.

Larger quantities of solutions from which successive doses are to be used are supplied in rubber-capped bottles. These can be filled from a burette protected as described above.

In the filling of ampoules and vials, and in fact in every operation connected with the preparation of sterile solutions, every care should be taken to avoid contamination by dust and by organisms from the hands and clothes of the operator. All work, whenever possible, should be carried out under a glass screen and the operator should practise using sterile forceps on every possible occasion, since no amount of scrubbing and disinfection will give really sterile hands.

Alkalinity of Glass. Certain medicaments such as adrenaline, insulin, liquid extract of pituitary, apomorphine, etc., are very sensitive to alkali and are quickly inactivated if the pH increases. In these cases the Pharmacopœia directs that their solutions shall only be dispensed or stored in containers which comply with the tests for the limit of alkalinity of glass. The latter tests only concern ampoules or similar glass containers having a range of capacity of from 0.5 millilitre to 25 millilitres. This precaution is a very important one.

Labelling of Ampoules. In dispensing, each ampoule should be labelled with the contents and the strength, in addition to the box which contains them. This is a very important point as unlabelled ampoules away from their box may lead to dangerous mistakes.

ISOTONIC SOLUTIONS

The preparation of sterile parenteral injections involves consideration of other factors besides that of sterilisation, the chief one being that of the osmotic pressure of the solution. Solutions having the same osmotic pressure are said to be *isotonic*, those having a lower osmotic pressure than the standard are said to be *hypotonic*, and those with a higher pressure, *hypertonic*. The clear serum of mammalian blood exerts an osmotic pressure equal to that of normal saline (physiological saline) which contains 0.9 per cent. of sodium chloride. These two solutions are therefore isotonic.

If red blood corpuscles are placed in a weaker solution of sodium chloride (hypotonic) water will diffuse through the cell-membrane and the cells will swell and may burst. In any case the red colouring matter, hæmoglobin, is released into the saline. If, on the other hand, they are placed in hypertonic saline, water will diffuse from the corpuscles into the saline. The corpuscles will shrivel and collapse, in all probability forming a clot which may produce fatal results.

It is quite a common practice to give patients intravenous injections of very large quantities of solutions such as sodium chloride and dextrose and for the above reasons it is important that they should be isotonic with the blood. Moreover, with subcutaneous or intramuscular injections, isotonic injections cause less local disturbance and pain and are therefore to be preferred.

It occasionally happens that it is necessary to produce solutions for use as eye drops or as eye lotions, which are isotonic with tears or lachrymal secretion in order to avoid irritation. A 1·4 per cent. solution of sodium chloride is isotonic with the lachrymal secretion.

To make a solution of any one of the following substances so that it is isotonic with mammalian blood serum, the weight in grammes given below should be dissolved in sufficient water to produce 100 millilitres or the weight given in grains dissolved in water to produce 4 fluid ounces.

Borax	2·90	gramm	
Calcium Chloride (anhydrous)	1·18	"	{ 20 " }
Dextrose	5·10	"	{ 90 " }
Magnesium Sulphate	6·35	"	{ 110 " }
Potassium Sulphate	2·11	"	{ 37 " }
Sodium Bicarbonate	1·35	"	{ 24 " }
Sodium Bromide	1·77	"	{ 30 " }
Sodium Chloride	0·91	"	{ 16 " }
Sodium Phosphate	4·53	"	{ 80 " }

The percentage strength of solutions isotonic with normal saline may be calculated by several methods.

The following formula gives the strength approximately:—

$$W = \frac{M \times 0.03}{N}$$

where W = the percentage strength of the isotonic solution required.

M = the molecular weight of the dissolved substance.

N = the number of ions which one molecule of the substance forms in aqueous solution.

Thus in calculations for (a) anhydrous calcium chloride solution, the following figures would be substituted:—

$$W = \frac{111 \times 0.03}{3}$$

= 1·11 grammes of CaCl_2 per 100 millilitres of solution.

For (b) dextrose.

$$W = \frac{180 \times 0.03}{1}$$

= 5·4 grammes per 100 millilitres of solution.

More accurate results may be obtained if data is known concerning the depression of the freezing-point of water by the substance. Isotonic

solutions have equal freezing-points. Normal saline and blood serum both freeze at -0.56° . The British Pharmaceutical Codex (p. 1284) gives the depression of the freezing-point of water caused by 1 per cent. of a number of substances. Thus 1 per cent. of sodium bicarbonate causes a depression of the freezing-point of water of 0.40° .

Using the following formula:—

$$W = \frac{1 \times 0.56}{X}$$

where W = the percentage strength of the isotonic solution required, and X = the depression of freezing-point produced by 1 per cent., in calculating for sodium bicarbonate, the following figures would be substituted:—

$$W = \frac{1 \times 0.56}{0.40}$$

= 1.4 grammes per 100 millilitres of solution.

TYPES OF INJECTIONS

Injections may be divided into two main classes, those intended for introduction through the skin (parenteral) and those which are passed directly through the external orifices of the body. The latter include rectal, vaginal and urethral injections which need not necessarily be sterile. Parenteral injections include the following types:—

INTRADERMAL INJECTIONS are given between the layers of the skin and this method is used for applying skin tests for specific immunity, such as the Schick test for diphtheria.

HYPODERMIC OR SUBCUTANEOUS INJECTIONS are usually aqueous solutions. The concentration of the solution is controlled by the dose, which should rarely exceed 1 millilitre (15 minims), since larger volumes cause discomfort. These injections should preferably be isotonic.

INTRAMUSCULAR INJECTIONS may be sera, aqueous or oily solutions, or suspensions. If they are aqueous solutions it is preferable to make them isotonic.

INTRAVENOUS INJECTIONS are given directly into the larger veins. They are of two types, those consisting of potent medicaments and having a small volume dose and those, like normal saline, which may have very large volume doses, from 50 millilitres to 1 litre. These perfusion solutions are often given to replace blood lost during hemorrhage and to minimise shock following operation or resulting from severe burns and it is essential that the following precautions should be taken. They should be:—(i) Sterile; (ii) isotonic unless otherwise ordered; and (iii) contain no solid particles capable of forming clots. Clots may cause the heart to stop.

INTRATHECAL INJECTIONS are intended for injection into the theca or sheath surrounding the spinal cord. The injections will mix with the cerebrospinal fluid and the greatest precautions must be taken to produce a sterile solution.

Sterilised Water

All injections should be prepared with sterilised water. The First Addendum to the B.P. 1932 directs that this shall be made by distilling potable water from a glass still or a still in which the distillate does not come in contact with copper, the first portion of the distillate being

rejected and the remainder collected in a sterilised neutral glass container. The latter should then be closed and sterilisation effected *immediately* by autoclaving. If the container is closed with cotton wool the water must be used within one month of its preparation. If, however, the glass is sealed by fusion, it may be stored for a longer period. In an emergency freshly distilled water which has been boiled for 30 minutes may be used as sterilised water.

PERCENTAGE SOLUTIONS

For scientific purposes, when great accuracy is required, the strength of a solution is expressed as the number of parts by weight of solute contained in 100 parts by weight of the solution. Expressed in this way, a 10 per cent. solution is one containing 10 grammes of solute in 100 grammes of solution, and the strength is independent of the temperature at which the solution is prepared. This kind of percentage solution is distinguished as percentage weight in weight (w/w); it is *not* the kind used in pharmacy in English-speaking countries although usual in Continental countries, where it is the practice in prescribing and dispensing, for quantities of liquids to be indicated by weight. In this country it is the practice for liquids to be measured, and the strength of a solution is therefore more conveniently expressed as parts by weight of the solute if a solid, or by volume if a liquid, in 100 parts by volume of the solution. These percentage solutions are distinguished as percentage weight in volume (w/v) or volume in volume (v/v), and they are the kinds always intended in dispensing unless otherwise stated.

It is obvious that to express the strength as percentage weight in volume is not so accurate as weight in weight, since the former is only correct at the temperature at which the solution was prepared. 100 ml. of a solution containing 10 g. of solute at 0° will contain slightly less than 10 g. at a higher temperature, *i.e.*, the solution is weaker. Such variations are, of course, very small; they are entirely negligible for pharmaceutical purposes. Any possible disadvantage is more than compensated for by the greater accuracy with which a required dose of the dissolved substance can be administered in the absence of a knowledge of the specific gravity of the solution.

In pharmacy, therefore, a 10 per cent., or 1 in 10, solution of a solid substance is, in the Metric system and unless otherwise stated, a solution containing 10 grammes of substance in 100 millilitres. In the Imperial system the calculations are not so straightforward, since, while the gramme and millilitre are corresponding units of weight and volume, the grain and minim are not, for 437.5 grains of water occupy 480 minims. The fluid ounce and the avoirdupois ounce (437.5 gr.) are, however, corresponding units, and a 10 per cent. solution in the Imperial system is obtained by dissolving 1 avoirdupois ounce (437.5 gr.) in sufficient solvent to yield 10 fl. oz. (4800 minims), 43.75 gr. in sufficient to yield 1 fl. oz., or 10 gr. in sufficient to yield 109.7 m. For many purposes, sufficiently close approximations are 10 gr. in 110 m., or 44 gr. in 1 fl. oz., the latter being the figure adopted in the General Notices of the B.P. 1932. It should be noted that a 10 per cent. solution in the Metric system is not absolutely identical with a 10 per cent. solution in the Imperial system. The General Notices state that a more precise figure

for the Imperial equivalent of a 10 per cent. solution in the Metric system is 43·847 gr. per fl. oz. The difference between this figure and that commonly adopted, viz. 43·75 gr., is due to the fact that 1 fl. oz. of water weighs 1 oz. at 16·7° whereas 1 ml. of water weighs 1 g. at 4° and therefore slightly less than 1 g. at 16·7°. *For the purpose of calculating Imperial equivalents of Metric quantities the most accurate basis is, therefore, that a solution containing 10 g. in 100 ml. is equivalent to one containing 43·847 gr. per fl. oz.* This basis has been adopted in compiling the Equivalent B.P. (1932) Formulæ included in the Pocket Book.

When dispensing prescriptions in which Metric units are not employed it may be assumed that a percentage solution is intended to be calculated on the Imperial system. It is therefore correct to dispense percentage solutions on the basis that a 10 per cent. solution is one containing 43·75 grains per fluid ounce, and this is the basis on which pharmaceutical calculations are usually made.

Dispensing Solutions

For dispensing purposes it is sometimes found convenient to use concentrated solutions of solid substances in frequent demand so that, instead of weighing on each occasion, a measured volume of the stock solution may be used with a consequent saving of time. Dispensing solutions are made so that one grain is contained in so many minims of solution. Thus a 1 in 3 dispensing solution contains 1 grain in 3 minims, or 1 drachm in 180 minims and 1 apothecaries' ounce (480 grains) in 3 fluid ounces; it must therefore be distinguished from a 1 in 3 solution, as defined above, which would contain only 1 avoirdupois ounce (437·5 grains) in 3 fluid ounces.

HOMŒOPATHIC PHARMACY

The Homœopathic system of medicine was founded by Samuel Hahnemann, a German physician, who was born in Saxony in 1755. Hahnemann, after having devoted several years to the practical testing of his theory, made public pronouncement of it in 1796. Briefly, the principle of the homœopathic doctrine is that diseases should be treated by drugs which, when given to a healthy person, produce symptoms similar to those present in the patient.

The doctrine is epitomised in the homœopathic motto "*Similia similibus curantur*"—"Likes are cured by likes." Hahnemann found that, as comparatively large doses of drugs are required to produce in the healthy person the symptoms of disease, so the same drugs when prescribed for the disease must be administered in infinitely smaller doses.

The pharmacist or pharmaceutical student is not directly concerned with the theory of homœopathy, but he may be called upon at any time to dispense the prescriptions of a homœopathic physician, and on this account a knowledge of the elements of homœopathic pharmacy is likely to be of service.

The *Homœopathic Pharmacopœia* states that "There are three forms of preparation recognised in homœopathic pharmacy:—

- (1) **Solution** in water, alcohol, or in mixtures of these liquids, or very rarely in ether, glycerin or syrup.
- (2) **Trituration** with sugar of milk.
- (3) **Liquid Attenuations.**"

These constitute all the preparations recognised by homœopaths, with the exception of pilules and globules, which, however, are merely *dispensing forms* of the liquid attenuations.

Homœopathic *materia medica* covers a wide range of medicaments, of vegetable, animal or mineral origin, which have been "proved." "It is," states the *Homœopathic Pharmacopœia*, "a fundamental rule in homœopathic practice to employ no medicine which has not been first proved by ascertaining its effects when given to healthy persons. This is a necessity of the law of similars, which requires that all diseases shall be treated by medicines that have been shown to be capable of producing on the healthy body symptoms in all essentials similar to those present in the sick person."

Turning to the conventional forms employed for administration of the medicines, the most important of these, and one which belongs to the class of "Solutions," is the *Mother Tincture*, the prescriber's sign for which is ϕ . Wherever practicable, the Mother Tincture represents one part of the drug contained in ten parts of alcohol. From this standard tincture the liquid attenuations are prepared. One part of Mother Tincture diluted with nine parts of alcohol produces the first decimal attenuation, the conventional sign for which is "1 \times ." One part of "1 \times " tincture and nine of alcohol produce the second decimal, or first centesimal attenuation "2 \times " or "1." Both decimal and centesimal scales are employed by the homœopath, and, as already shown, the former is indicated by the "x" sign, the latter by the numeral.

Mother Tinctures, the starting point of these attenuations, are prepared in the usual pharmaceutical manner—by maceration or percolation, as the case may require. There is no limit to the length to which the process of attenuation may be carried, and although "1 \times " or "3 \times " tinctures of drugs, such as belladonna, nux vomica, and aconite are freely prescribed, the homœopathic doctor may order a tincture of the 6th, 20th, or 30th attenuation.

In the case of *Solutions*, other than tinctures, the strongest preparation is the "1 \times " (where a solution of 1 in 10 is practicable), which corresponds to the "Mother Tincture" of vegetable drugs. "Solutions" consist of simple chemicals dissolved in water or weak alcohol, or occasionally in ether, syrup, etc. The strength of the solution depends, of course, on the solubility of the drug employed, and attenuations are made in exactly the same way as in the case of tinctures. As examples, the strongest homœopathic solution of arsenic is the "Arsenicum Album 2 \times ," from which the weaker preparations are prepared.

Triturations are a very important feature of homœopathic pharmacy. These consist of an intimate mixture of the drug with sugar of milk, in the usual decimal or centesimal proportions, the process of trituration being conducted in a very thorough manner. One part of, for example, quinine phosphate ("Chin. Phosph.") mixed with nine parts of sugar of milk, forms the "1 \times " trituration, from which subsequent triturations may be made in the same manner.

Reference to the third class of homœopathic preparations—Liquid Attenuations—has already been made in the notes on Mother Tinctures and Solutions. Liquid Attenuations are also made from triturations, the first (or strongest) of such attenuations being 7 \times , made by dissolving

10 grains of 6^x trituration in 100 minims of distilled water with 5 per cent. of alcohol.

Homœopathic pilules or globules are made by saturating pellets, composed of pure sugar, with a tincture of the prescribed attenuation. Although not officially recognised, compressed tablets and tablet-triturations are also prescribed by the modern homœopathic physician.

Liniments, glyceroles, ointments, lotions, and plasters are made on a principle similar, as regards strength, to that applied to tinctures and triturations—medicated liniments, for example, containing one part of tincture in nine parts of a solution of soap in alcohol; while a “glycerole” is simply a tincture mixed with glycerin in the proportion of 1 to 9.

When prescribing, the homœopathic physician may order his medicines in one or the other of the following forms:—

- (1) A small bottle of tincture, trituration, or pilules (usually 1, 2, or 4 drachms), of whatever attenuation he may desire, with directions as to dosage, *e.g.*,

(a) *R*. Belladonnæ 1^x ζ ii.

Sig. Two drops to be taken in water every four hours.

(b) *R*. Arsenici Iodidi 3^x ζ iv.

Sig. As much as will cover a threepenny piece, three times a day.

(c) *R*. Nucis Vomicae 3^x ζ i pil.

Sig. Two pilules every four hours.

- (2) **Mixtures.**—These are usually of a very simple nature, consisting of the tincture diluted with water, *e.g.*,

R. Chamomilæ ϕ ζ i.

Aquam ad ζ ii.

Sig. One teaspoonful every hour.

- (3) **Powders.**—In these, each dose of the trituration is wrapped in paper in the usual manner, or the powders may take the form shown in the second example below:—

(a) *R*. Merc. Biniod. 3^x gr. ii in ch.

Mitte xii.

Sig. One powder to be taken night and morning, dry, on the tongue.

(b) *R*. Acteæ Racemosæ 1^x gtt. ii.

Sacchar. Lact. gr. iv.

M. ft. pulv. Mitte vi.

Sig. Dissolve one powder in three tablespoonfuls of water, and take one tablespoonful every four hours.

Homœopathic doctors often adhere to an obsolete form of chemical nomenclature, and quite commonly prescribe their attenuations of, for example, potassium iodide, sodium carbonate, mercuric chloride, and quinine sulphate, as *Kali Iodid.*, *Natr. Carb.*, *Merc. Corr.*, and *Chin. Sulph.*, respectively.

EQUIVALENT B.P. (1932) FORMULÆ

The following equivalent formulæ have been prepared for the convenience of the pharmacist when preparing quantities in Imperial weights and measures. The formulæ give only the proportions of the constituents and quantities to be used in the process of manufacture; for the method the pharmacist is referred to the B.P. It should be noted that the quantities given here in the Imperial system are not the equivalent of the individual quantities given in the B.P. in the metric system; therefore, whichever formula is used the quantities specified in that particular formula must be adhered to throughout. Liquids should be measured in all cases unless the contrary is specifically indicated. It should be noted that the Imperial system is standardised at a temperature of 16.7° (62°F.), at which temperature 1 ml. of water weighs somewhat less than 1 g.; therefore, in making percentage w/v solutions with Imperial weights and measures to correspond with the percentage w/v preparations of the B.P. it is necessary to take 438.47 gr. (approximately 438½ gr.) as equal to 1 oz. In the following formulæ this has been the basis of calculation, but as it often leads to inconvenient fractions the figures have been rounded off for the sake of practical convenience. Where inconvenient fractions occur, it will usually be found that the nearest half grain or minim, up or down, can be reckoned.

Abbreviations:—gr.=grain; m.=minim; oz.=ounce; fl. oz.=fluid ounce; q.s.=in sufficient quantity; w/v=weight in volume.

NOTE.—Preparations in which the final weight or volume is determined by an assay process, chemical or biological, have not been included, such formulæ not being generally required in Imperial weights and measures.

Acetum Scillæ.—VINEGAR OF SQUILL.

Squill, or Indian Squill, bruised 2 oz.
Dilute Acetic Acid 20 fl. oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P. 1932.

Acidum Aceticum Dilutum.—DILUTE ACETIC ACID.

Acetic Acid, by weight 3 oz. 297 gr.
Distilled Water.....to 20 fl. oz.

Acidum Hydrochloricum Dilutum.—DILUTE HYDROCHLORIC ACID.

Hydrochloric Acid, by weight 6 oz. 250 gr.
Distilled Water.....to 20 fl. oz.

Acidum Phosphoricum Dilutum.—DILUTE PHOSPHORIC ACID.

Phosphoric Acid, by weight 2 oz. 164 gr.
Distilled Water.....to 20 fl. oz.

Acidum Sulphuricum Dilutum.—DILUTE SULPHURIC ACID.
 Sulphuric Acid, by weight 2 oz. 99 gr.
 Distilled Water.....to 20 fl. oz.

Adeps Benzoinatus.—BENZOINATED LARD.
 Lard 20 oz.
 Benzoin, coarsely powdered 263 gr.
 Prepare in accordance with the directions given in the B.P., 1932.

Adeps Lanæ Hydrosus.—HYDROUS WOOL FAT. SYN. LANOLIN.
 Wool Fat 14 oz.
 Distilled Water..... 6 fl. oz.
 Prepare in accordance with the directions given in the B.P., 1932.

Aqua Anethi Concentrata.—CONCENTRATED DILL WATER.
 Oil of Dill 192 m.
 Alcohol, 90% 12 fl. oz.
 Distilled Water, or Water.....to 20 fl. oz.
 Prepare in accordance with the directions given in the B.P., 1932.

Aqua Anethi Destillata.—DISTILLED DILL WATER.
 Dill 2 oz.
 Water..... 40 fl. oz.
 Distil 20 fl. oz. in accordance with the directions given in the B.P., 1932.

Aqua Camphoræ.—CAMPHOR WATER.
 Camphor 8½ gr.
 Alcohol, 90% 19½ m.
 Distilled Water, or Water.....to 20 fl. oz.
 Prepare in accordance with the directions given in the B.P., 1932.

Aqua Chloroformi.—CHLOROFORM WATER.
 Chloroform 24 m.
 Distilled Water, or Water.....to 20 fl. oz.

Aqua Cinnamomi Concentrata.—CONCENTRATED CINNAMON WATER.
 Oil of Cinnamon 192 m.
 Alcohol, 90% 12 fl. oz.
 Distilled Water, or Water.....to 20 fl. oz.
 Prepare in accordance with the directions given in the B.P., 1932.

Aqua Cinnamomi Destillata.—DISTILLED CINNAMON WATER.
 Cinnamon, bruised 2 oz.
 Water..... 40 fl. oz.
 Distil 20 fl. oz. in accordance with the directions given in the B.P., 1932.

Aqua Menthæ Piperitæ Concentrata.—CONCENTRATED PEPPERMINT WATER.
 Oil of Peppermint 192 m.
 Alcohol, 90% 12 fl. oz.
 Distilled Water, or Water.....to 20 fl. oz.
 Prepare in accordance with the directions given in the B.P., 1932.

Aqua Menthae Piperitae Destillata.—DISTILLED PEPPERMINT WATER.

Oil of Peppermint 9½ m.
 Water..... 30 fl. oz.

Distil 20 fl. oz. in accordance with the directions given in the B.P., 1932.

Argenti Nitras Induratus.—TOUGHENED SILVER NITRATE.

Silver Nitrate 1 oz. 393½ gr.
 Potassium Nitrate 43½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Bromethol.—BROMETHOL. SYN. SOLUTION OF TRIBROMOETHYL ALCOHOL.

Tribromoethyl Alcohol, by weight 2 oz.
 Amylene Hydrate, by weight..... 1 oz.

Prepare in accordance with the directions given in the Third Addendum to the B.P., 1932.

Cataplasma Kaolini.—POULTICE OF KAOLIN.

Kaolin, finely sifted, dried at 100° 10 oz. 236½ gr.
 Boric Acid, finely sifted 393½ gr.
 Methyl Salicylate 19½ m.
 Oil of Peppermint 4½ m.
 Thymol 4½ gr.
 Glycerin, or Sodium Lactate 70%, by weight 8½ oz.

Prepare in accordance with the directions given in the B.P., 1932, or if Sodium Lactate 70%, be used, in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Collodium Flexile.—FLEXIBLE COLLODION. SYN. COLLODION.

Pyroxylin..... 175½ gr.
 Colophony 263 gr.
 Castor Oil, by weight 175½ gr.
 Alcohol, 90% 4 fl. oz. 384 m.
 Ether to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Confectio Sennae.—CONFECTION OF SENNA.

Senna Leaf, in fine powder 5 oz.
 Coriander, in fine powder 2 oz.
 Figs of commerce 8 oz.
 Tamarind 6 oz.
 Cassia 6 oz.
 Prunes of commerce 4 oz.
 Extract of Liquorice ½ oz.
 Sucrose 20 oz.
 Distilled Water..... q.s.

Prepare in accordance with the directions given in the B.P., 1932; boiling the figs, Tamarind, and prunes in 17½ fl. oz. of Distilled Water, and making the final product weigh not less than 50 oz. and not more than 55 oz.

Confectio Sulphuris.—CONFECTION OF SULPHUR.

Precipitated Sulphur	9 oz.
Potassium Acid Tartrate, in fine powder ..	2 oz. 87½ gr.
Tragacanth, in fine powder	43½ gr.
Syrup	4 fl. oz. 96 m.
Tincture of Orange	1 fl. oz. 48 m.
Glycerin	3 fl. oz. 192 m.

Prepare in accordance with the directions given in the B.P., 1932.

Note: The Tincture of Orange may be omitted in preparing this confection.

Elixir Cascaræ Sagradæ.—ELIXIR OF CASCARA SAGRADA.

Cascara Sagrada, in coarse powder	20 oz.
Liquorice, unpeeled, in coarse powder ..	2½ oz.
Light Magnesium Oxide	3 oz.
Soluble Saccharin	8½ gr.
Oil of Coriander	1½ m.
Oil of Anise	2 m.
Alcohol, 90%	120 m.
Glycerin	6 fl. oz.
Distilled Water	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; moistening the Cascara Sagrada, Liquorice and Light Magnesium Oxide with 25 fl. oz. of boiling Distilled Water, evaporating the percolate to 13 fl. oz., dissolving the Soluble Saccharin in 115 m. of Distilled Water, and making the final volume up to 20 fl. oz. with Distilled Water; or prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; replacing the Glycerin with 48 m. of Chloroform and evaporating the percolate to 19 fl. oz.

Emplastrum Cantharidini.—PLASTER OF CANTHARIDIN. SYN. CANTHARIDIN PLASTER; BLISTERING PLASTER.

Cantharidin	17½ gr.
Acetone	2 fl. oz.
Castor Oil, by weight	4 oz.
Yellow Beeswax	8 oz.
Wool Fat	7 oz. 421 gr.

Prepare in accordance with the directions given in the B.P., 1932.

Emplastrum Colophonil.—PLASTER OF COLOPHONY. SYN. EMPLASTRUM RESINÆ; RESIN PLASTER; ADHESIVE PLASTER.

Colophony	2 oz.
Plaster of Lead	17 oz.
Hard Soap	1 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Emplastrum Plumbi.—PLASTER OF LEAD. SYN. LEAD PLASTER; DIACHYLON PLASTER; DIACHYLON.

Lead Monoxide	5 oz.
Olive Oil, or Arachis Oil, by weight	10 oz.
Distilled Water	q.s.

Prepare in accordance with the directions given in the B.P., 1932; boiling the Lead Monoxide and the Olive Oil, or Arachis Oil, with 5 fl. oz. of Distilled Water.

Emulsio Chloroformi.—EMULSION OF CHLOROFORM.

Chloroform	1 fl. oz.
Liquid Extract of Quillaia	9½ m.
Mucilage of Tragacanth	1 fl. oz.
Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932.

Emulsio Menthae Piperitæ.—EMULSION OF PEPPERMINT.

Oil of Peppermint	2 fl. oz.
Liquid Extract of Quillaia	24 m.
Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932.

Emulsio Olei Morrhuae.—EMULSION OF COD-LIVER OIL.

Cod-liver Oil	10 fl. oz.
Acacia, in powder	2 oz. 221 gr.
Tragacanth, in powder	61½ gr.
Purified Volatile Oil of Bitter Almond....	9½ m.
Soluble Saccharin	1 gr.
Chloroform	19 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Second Addendum to the B.P., 1932; triturating the Cod-liver Oil with the Acacia and Tragacanth and adding 5 fl. oz. of Distilled Water as directed; adding the Soluble Saccharin dissolved in 19 m. of Distilled Water, the Purified Volatile Oil of Bitter Almond and the Chloroform and making the final volume up to 20 fl. oz. with Distilled Water.

Emulsio Olei Vitaminati.—EMULSION OF VITAMINISED OIL.

Vitaminised Oil	10 fl. oz.
Acacia, in powder	2 oz. 221 gr.
Tragacanth, in powder	61½ gr.
Purified Volatile Oil of Bitter Almond	9½ m.
Soluble Saccharin	1 gr.
Chloroform	19 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Second Addendum to the B.P., 1932; triturating the Vitaminised Oil with the Acacia and Tragacanth and adding 5 fl. oz. of Distilled Water as directed; adding the Soluble Saccharin dissolved in 19 m. of Distilled Water, the Purified Volatile Oil of Bitter Almond and the Chloroform and making the final volume up to 20 fl. oz. with Distilled Water.

Extractum Cascarae Sagradae Liquidum.—LIQUID EXTRACT OF CASCARA SAGRADA. SYN. FLUID EXTRACT OF CASCARA SAGRADA.

Cascara Sagrada, in coarse powder	20 oz.
Alcohol, 90%	5 fl. oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; evaporating the percolate to 12 fl. oz., adding the Alcohol previously mixed with 3 fl. oz. of Distilled Water, and making the final volume up to 20 fl. oz. with Distilled Water if necessary.

Extractum Cinchonæ Liquidum.—LIQUID EXTRACT OF CINCHONA.

Extract of Cinchona	10 oz. 9½ gr.
Hydrochloric Acid	288 m.
Glycerin	2 fl. oz.
Alcohol, 90%	5 fl. oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; mixing the Extract of Cinchona with the Alcohol and 5 fl. oz. of Distilled Water, and finally making up to 20 fl. oz. with Distilled Water.

Extractum Colocynthis Compositum.—COMPOUND EXTRACT OF COLOCYNTH.

Colocynth, crushed	5 oz. 175 gr.
Aloes, in fine powder	11 oz. 87½ gr.
Scammony Resin, in fine powder	3 oz. 307 gr.
Curd Soap, in fine powder	2 oz. 350½ gr.
Cardamom, in fine powder	394 gr.
Alcohol, 60%	140 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Extractum Malti cum Oleo Morrhuæ.—EXTRACT OF MALT WITH COD LIVER OIL.

Extract of Malt, by weight	18 oz.
Cod-Liver Oil, by weight	2 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Extractum Malti cum Oleo Vitaminato.—EXTRACT OF MALT WITH VITAMINISED OIL.

Extract of Malt, by weight	18 oz.
Vitaminised Oil, by weight	2 oz.

Prepare in accordance with the directions given in the Second Addendum to the B.P., 1932.

Extractum Quillaie Liquidum.—LIQUID EXTRACT OF QUILLAIA.

Quillaia, in moderately fine powder	20 oz.
Alcohol, 45%	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; reserving the first 17 fl. oz. of percolate.

Extractum Scillæ Liquidum.—LIQUID EXTRACT OF SQUILL.

Squill, or Indian Squill, in coarse powder ..	20 oz.
Alcohol, 70%	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; reserving the first 17 fl. oz. of percolate.

Ferri Carbonas Saccharatus.—SACCHARATED IRON CARBONATE.

Ferrous Sulphate	20 oz.
Liquid Glucose	6 oz. 45½ gr.
Sodium Carbonate	21 oz. 245 gr.
Distilled Water	q.s.

Prepare in accordance with the directions given in the B.P., 1932; dissolving 3 oz. of the Liquid Glucose in 60 fl. oz. of Distilled Water and dissolving the Ferrous Sulphate in this solution; dissolving the Sodium Carbonate in 30 fl. oz. of Distilled Water; mixing the solutions as directed and adding 80 fl. oz. of Distilled Water; using two successive

quantities each of 80 fl. oz. of Distilled Water to wash the precipitate, finally adding the remainder of the Liquid Glucose, drying at a temperature not exceeding 100° and powdering the product.

Gelatinum Zinci.—GELATIN OF ZINC. SYN. UNNA'S PASTE.

Zinc Oxide, finely sifted	3 oz.
Gelatin, cut small	3 oz.
Glycerin, by weight	7 oz.
Distilled Water	7 fl. oz. or q.s.

Prepare in accordance with the directions given in the B.P., 1932; making the weight of the dissolved Gelatin and Glycerin equal to 17 oz. before incorporating the Zinc Oxide.

Glycerinum Acidi Borici.—GLYCERIN OF BORIC ACID. SYN. GLYCERITE OF BOROGLYCERIN.

Boric Acid	6 oz. 87½ gr.
Glycerin	q.s.

Prepare in accordance with the directions given in the B.P., 1932; heating 9 oz. 87½ gr. of Glycerin to 140°-150° adding the Boric Acid and evaporating until the weight has been reduced to 10 oz. 175 gr., finally adding Glycerin to produce 20 oz.

Glycerinum Acidi Tannici.—GLYCERIN OF TANNIC ACID.

Tannic Acid	3 oz.
Glycerin, by weight	17 oz.

Prepare in accordance with the directions given in the B.P., 1932.

or

Tannic Acid	3 oz. 388½ gr.
Tragacanth, finely powdered	105½ gr.
Chloroform	48 m.
Alcohol, 90%	192 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; dissolving the Tannic Acid in 10 fl. oz. of Distilled Water, filtering and washing the filter with Distilled Water until the filtrate measures 18 fl. oz.; mixing the Tragacanth with the Alcohol, 90%, and the Chloroform and adding the solution of Tannic Acid as directed; finally making the volume up to 20 fl. oz. with Distilled Water.

Glycerinum Aluminis.—GLYCERIN OF ALUM.

Potash Alum, or Ammonia Alum, in crystals	2 oz. 262½ gr.
Distilled Water	1 fl. oz. 96 m.
Glycerin, by weight	16 oz. 87½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Glycerinum Amyli.—GLYCERIN OF STARCH. SYN. GLYCERITE OF STARCH.

Starch	1 oz. 306½ gr.
Distilled Water	3 fl. oz. 192 m.
Glycerin, by weight	14 oz. 393½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Glycerinum Boracis.—GLYCERIN OF BORAX.

Borax 2 oz. 175 gr.

Glycerin, by weight 17 oz. 262½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Glycerinum Phenolis.—GLYCERIN OF PHENOL. SYN. GLYCERINUM ACIDI CARBOLICI.

Phenol 3 oz. 87½ gr.

Glycerin, by weight 16 oz. 350 gr.

Prepare in accordance with the directions given in the B.P., 1932.

Hydrargyrum cum Creta.—MERCURY WITH CHALK. SYN. GREY POWDER.

Mercury 6 oz. 262½ gr.

Chalk 13 oz. 175 gr.

Prepare in accordance with the directions given in the B.P., 1932.

Hydrargyrum Oleatum.—OLEATED MERCURY.

Yellow Mercuric Oxide 4 oz.

Liquid Paraffin, by weight 1 oz.

Oleic Acid, by weight 15 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Aurantii Concentratum.—CONCENTRATED INFUSION OF ORANGE PEEL.

Dried Bitter-Orange Peel, cut small 8 oz.

Alcohol, 25% 27 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Orange Peel with 20 fl. oz. of the Alcohol, 25%, and again with 7 fl. oz. of Alcohol, 25%.

Infusum Aurantii Recens.—FRESH INFUSION OF ORANGE PEEL.

Dried Bitter-Orange Peel, cut small 1 oz.

Distilled Water, or Water, boiling, by

weight 20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Buchu Concentratum.—CONCENTRATED INFUSION OF BUCHU.

Buchu, freshly broken 8 oz.

Alcohol, 25% q.s.

Prepare in accordance with the direction given in the B.P., 1932; percolating the Buchu with Alcohol, 25%, collecting and reserving 15 fl. oz., evaporating the succeeding 20 fl. oz., dissolving it in the reserved portion and finally making up to 20 fl. oz. with Alcohol, 25%.

Infusum Buchu Recens.—FRESH INFUSION OF BUCHU.

Buchu, freshly broken 1 oz.

Distilled Water, or Water, boiling, by

weight 20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Calumbæ Concentratum.—CONCENTRATED INFUSION OF CALUMBA.

Calumba, cut small 8 oz.

Alcohol, 90% 5 fl. oz.

Distilled Water, cold q.s.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Calumba in 22 fl. oz. of Distilled Water, again in 10 fl. oz. of Distilled Water, and a third time in 10 fl. oz. of Distilled Water; evaporating the products of the second and third macerations to 5 fl. oz., adding it to the product of the first maceration, then adding the Alcohol, 90%, and making up to 20 fl. oz. with Distilled Water.

Infusum Calumbæ Recens.—FRESH INFUSION OF CALUMBA.

Calumba, cut small 1 oz.
Distilled Water, or Water, cold. 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Caryophylli Concentratum.—CONCENTRATED INFUSION OF CLOVE.

Clove, bruised 4 oz.
Alcohol, 25% 22 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Clove with 12 fl. oz. of Alcohol, 25%, and again with 10 fl. oz. of Alcohol, 25%.

Infusum Caryophylli Recens.—FRESH INFUSION OF CLOVE.

Clove, bruised $\frac{1}{2}$ oz.
Distilled Water, or Water, boiling, by weight 20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Digitalis Recens.—FRESH INFUSION OF DIGITALIS. SYN. INFUSUM DIGITALIS; INFUSION OF DIGITALIS.

Powdered Digitalis, equivalent to 35 gr. of International Standard Digitalis Powder.

Distilled Water, or Water, boiling, by weight 20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Gentianæ Compositum Concentratum.—CONCENTRATED COMPOUND INFUSION OF GENTIAN.

Gentian, thinly sliced 2 oz.
Dried Bitter-Orange Peel, cut small 2 oz.
Lemon Peel, cut small 4 oz.
Alcohol, 25% 24 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Gentian, Orange, and Lemon Peels with 20 fl. oz. of Alcohol, 25%, and a second time with 4 fl. oz.

Infusum Gentianæ Compositum Recens.—FRESH COMPOUND INFUSION OF GENTIAN.

Gentian, thinly sliced $\frac{1}{2}$ oz.
Dried Bitter-Orange Peel, cut small $\frac{1}{2}$ oz.
Lemon Peel, cut small $\frac{1}{2}$ oz.
Distilled Water, or Water, boiling, by weight 20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Quassiae Concentratum.—CONCENTRATED INFUSION OF QUASSIA.

Quassia, rasped	1 oz. 263 gr.
Alcohol, 90%	5 fl. oz.
Distilled Water, cold	q.s.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Quassia with 13 fl. oz. of Distilled Water, again with 10 fl. oz. of Distilled Water, and a third time with 10 fl. oz. of Distilled Water; evaporating the products of the second and third macerations to 5 fl. oz., adding it to the product of the first maceration, adding the Alcohol, 90%, and finally making up to 20 fl. oz. with Distilled Water.

Infusum Quassiae Recens.—FRESH INFUSION OF QUASSIA.

Quassia, rasped	87½ gr.
Distilled Water, or Water, cold	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Senegæ Concentratum.—CONCENTRATED INFUSION OF SENEGA.

Senega, in coarse powder	8 oz.
Dilute Solution of Ammonia	q.s.
Alcohol, 25%	q.s.

Prepare in accordance with the directions given in the B.P., 1932; percolating the Senega with Alcohol, 25%, reserving the first 15 fl. oz., continuing the percolation until a further 20 fl. oz. has been collected; evaporating the second percolate, adding it to the reserved portion, then making faintly alkaline by addition of the Ammonia and finally adding Alcohol, 25%, to make 20 fl. oz.

Infusum Senegæ Recens.—FRESH INFUSION OF SENEGA.

Senega, in coarse powder	1 oz.
Distilled Water, or Water, boiling, by weight	20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Infusum Sennæ Concentratum.—CONCENTRATED INFUSION OF SENNA.

Senna Fruit, lightly crushed	16 oz.
Strong Tincture of Ginger	1 fl. oz. 288 m.
Alcohol, 20%	q.s.

Prepare in accordance with the directions given in the B.P., 1932; percolating the Senna Fruit with Alcohol, 20%, reserving the first 14 fl. oz., continuing the percolation until a further 20 fl. oz. has been collected; evaporating the second percolate, adding it to the reserved portion, adding the strong Tincture of Ginger and finally making up to 20 fl. oz. with Alcohol, 20%.

Infusum Sennæ Recens.—FRESH INFUSION OF SENNA.

Senna Fruit	2 oz.
Ginger, sliced	43½ gr.
Distilled Water, or Water, boiling, by weight	20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Injectio Bismuthi.—INJECTION OF BISMUTH.

Precipitated Bismuth, in very fine powder..	438½ gr.
Dextrose	109½ gr.
Cresol	12 m.
Distilled Water, freshly prepared	to 5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Injectio Bismuthi Oxychloridi.—INJECTION OF BISMUTH OXYCHLORIDE.

Bismuth Oxychloride, in very fine powder..	219½ gr.
Dextrose	109½ gr.
Chlorocresol	5 m.
Distilled Water, freshly prepared	to 5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932, dissolving the Chlorocresol in 4 fl. oz. of freshly prepared Distilled Water.

Injectio Bismuthi Salicylatis.—INJECTION OF BISMUTH SALICYLATE.

Bismuth Salicylate, in very fine powder....	219½ gr.
Camphor	22 gr.
Phenol	22 gr.
Olive Oil, or Arachis Oil.....	to 5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Injectio Calcii Gluconatis.—INJECTION OF CALCIUM GLUCONATE.

Calcium Gluconate	219½ gr.
Distilled Water, freshly prepared	4 fl. oz. 360 m.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Injectio Ferri.—INJECTION OF IRON.

Solution of Ferric Chloride	168 m.
Citric Acid	43½ gr.
Dilute Solution of Ammonia	q.s.
Distilled Water.....	q.s.
Sterilised Water	to 5 fl. oz.

Prepare in accordance with the direction in the B.P., 1932, modified in the Fourth Addendum thereto; mixing 144 m. of Dilute Solution of Ammonia with 1 fl. oz. 120 m. of Distilled Water, diluting the Solution of Ferric Chloride with 1 fl. oz. 360 m. of Distilled Water, rinsing the vessel with ½ fl. oz. of Distilled Water, dissolving the Citric Acid in 120 m. of Distilled Water, using 240 m. of Distilled Water for washing, and finally making up to 5 fl. oz. with Sterilised Water.

Injectio Hydrargyri.—INJECTION OF MERCURY. SYN. MERCURY CREAM.

Mercury	219½ gr.
Wool Fat	2 oz. 221 gr.
Camphor	219½ gr.
Creosote	240 m.
Olive Oil, or Arachis Oil.....	1 fl. oz. 72 m.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; triturating the Mercury with 219½ gr. of the Wool Fat.

Injectio Hydrargyri Subchloridi.—INJECTION OF MERCUROUS CHLORIDE. SYN. CALOMEL INJECTION.

Mercurous Chloride, in very fine powder..	109½ gr.
Wool Fat	2 oz. 221 gr.
Camphor	219½ gr.
Creosote	240 m.
Olive Oil, or Arachis Oil.....	1 fl. oz. 72 m.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Injectio Leptazoli.—INJECTION OF LEPTAZOL.

Leptazol	219½ gr.
Sodium Phosphate	5½ gr.
Distilled Water.....to	5 fl. oz.

Prepare in accordance with the directions given in the Third Addendum to the B.P., 1932.

Injectio Mersalyli.—INJECTION OF MERSALYL.

Mersalyl	219½ gr.
Theophylline	109½ gr.
Solution of Sodium Hydroxide.....	36 m. or q.s.
Distilled Water, freshly prepared	5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; dissolving the Mersalyl and Theophylline in 4 fl. oz. of the freshly prepared Distilled Water.

Injectio Nikethamidi.—INJECTION OF NIKETHAMIDE.

Nikethamide.....	1 oz. 110½ gr.
Distilled Water, freshly prepared	5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Injectio Procainæ et Adrenalinæ Fortis.—INJECTION OF PROCAINE AND ADRENALINE.

Procaine Hydrochloride	44 gr.
Sodium Chloride	11 gr.
Chlorocresol	2½ gr.
Solution of Adrenaline Hydrochloride....	48 m.
Sodium Metabisulphite	2½ gr.
Distilled Water, freshly prepared	5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; dissolving the Chlorocresol in about 4½ fl. oz. of freshly prepared Distilled Water.

Injectio Quininæ et Urethani.—INJECTION OF QUININE AND URETHANE.

Quinine Hydrochloride	274 gr.
Urethane	137 gr.
Chlorocresol	2½ gr.
Distilled Water, freshly prepared	5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; dissolving the Chlorocresol in 4 fl. oz. of freshly prepared Distilled Water.

Injectio Sodii Chloridi et Acaciæ.—INJECTION OF SODIUM CHLORIDE AND ACACIA.

Sodium Chloride 79 gr.
 Acacia, in large complete tears free from
 dust 1 oz. 88½ gr.
 Sterilised Water.....to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Acacia and Sodium Chloride in 19 fl. oz. of Sterilised Water and finally making up to 20 fl. oz. with Sterilised Water.

Injectio Sodii Morrhuat. —INJECTION OF SODIUM MORRHUATE.

Sodium Morrhuate 109½ gr.
 Chlorocresol 2½ gr.
 Alcohol, 90% 24 m.
 Distilled Water, freshly preparedto 5 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; dissolving the Chlorocresol in 4½ fl. oz. of freshly prepared Distilled Water.

Lamellæ.—Base for Lamellæ.

Gelatin, cut small 1 oz. 350 gr.
 Glycerin, by weight 87½ gr.
 Distilled Water, by weight 8 oz. 350 gr. or q.s.

Prepare in accordance with the directions given in the B.P., 1932; adjusting the weight if necessary to 10 oz. by the addition of Distilled Water.

Linimentum Aconiti.—LINIMENT OF ACONITE.

Aconite, in moderately coarse powder..... 10 oz. 9½ gr.
 Camphor 263 gr.
 Alcohol, 90% q.s.

Prepare in accordance with the directions given in the B.P., 1932; exhausting the Aconite by percolation, reserving the first 15 fl. oz. of percolate, evaporating the remainder, adding it to the reserved portion, dissolving the Camphor in the mixture and finally making up to 20 fl. oz. with Alcohol, 90%.

Linimentum Camphoræ.—LINIMENT OF CAMPHOR. SYN. CAMPHORATED OIL.

Camphor 1 oz.
 Olive Oil, Arachis Oil, Cotton Seed Oil, or
 Sesame Oil, by weight 4 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Linimentum Camphoræ Ammoniatum.—AMMONIATED LINIMENT OF CAMPHOR.

Camphor 2 oz. 221 gr.
 Oil of Lavender 48 m.
 Strong Solution of Ammonia 5 fl. oz.
 Alcohol, 90%to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Linimentum Saponis.—LINIMENT OF SOAP.

Soft Soap	1 oz. 264 gr.
Camphor	350½ gr.
Oil of Rosemary	144 m.
Distilled Water	3 fl. oz. 192 m.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Soap, Camphor and Oil of Rosemary in 12 fl. oz. of Alcohol, 90%, adding the Distilled Water and finally making up to 20 fl. oz. with Alcohol, 90%.

Linimentum Terebinthinæ.—LINIMENT OF TURPENTINE.

Soft Soap	1 oz. 220½ gr.
Camphor	438½ gr.
Oil of Turpentine	13 fl. oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; first mixing the Soft Soap with 2 fl. oz. of Distilled Water.

Linimentum Terebinthinæ Aceticum.—ACETIC LINIMENT OF TURPENTINE. SYN. LINIMENT OF TURPENTINE AND ACETIC ACID.

Glacial Acetic Acid	2 fl. oz. 96 m.
Liniment of Camphor	8 fl. oz. 432 m.
Oil of Turpentine	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Adrenalinæ Hydrochloridi.—SOLUTION OF ADRENALINE HYDROCHLORIDE.

Adrenaline	8½ gr.
Chlorbutol	43½ gr.
Sodium Chloride	79 gr.
Dilute Hydrochloric Acid	28½ m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; first dissolving the Chlorbutol and Sodium Chloride in 18 fl. oz. of boiling Distilled Water.

Liquor Ammoniaæ Dilutus.—DILUTE SOLUTION OF AMMONIA.

Strong Solution of Ammonia	5 fl. oz.
Distilled Water	to 15 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Ammonii Acetatis Dilutus.—DILUTE SOLUTION OF AMMONIUM ACETATE.

Strong Solution of Ammonium Acetate ..	2½ fl. oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Ammonii Acetatis Fortis.—STRONG SOLUTION OF AMMONIUM ACETATE.

Glacial Acetic Acid, by weight	9 oz. 35 gr.
Ammonium Carbonate	6 oz. 269 gr.
Strong Solution of Ammonia	2 fl. oz. or q.s.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; first mixing the Glacial Acetic Acid with 7 fl. oz. of Distilled Water.

Liquor Ammonia Aromaticus.—AROMATIC SOLUTION OF AMMONIA.

Ammonium Carbonate	219½ gr.
Strong Solution of Ammonia.....	1 fl. oz. 24 m.
Oil of Lemon	4½ m.
Oil of Nutmeg	3 m.
Alcohol, 90%	360 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; dissolving the Ammonium Carbonate in 16 fl. oz. of Distilled Water; adding the Oil of Lemon and Oil of Nutmeg dissolved in the Alcohol, 90%, the Strong Solution of Ammonia and sufficient Distilled Water to produce 20 fl. oz.; finally adding ½ oz. of powdered talc or kieselguhr, shaking well and filtering.

Liquor Arsenicalis.—ARSENICAL SOLUTION. SYN. SOLUTIO ARSENICALIS SEU FOWLERI I.A.; FOWLER'S SOLUTION.

Arsenic Trioxide, in powder	87½ gr.
Solution of Potassium Hydroxide.....	2 fl. oz.
Dilute Hydrochloric Acid	268½ m. or q.s.
Distilled Water.....	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Arsenic Trioxide in the Solution of Potassium Hydroxide, adding 10 fl. oz. of Distilled Water and after neutralising with the Dilute Hydrochloric Acid, making up to 20 fl. oz. with Distilled Water.

Liquor Arseni et Hydrargyri Iodidi.—SOLUTION OF ARSENOUS AND MERCURIC IODIDES. SYN. DONOVAN'S SOLUTION.

Arsenic Triiodide.....	87½ gr.
Red Mercuric Iodide.....	87½ gr.
Distilled Water.....	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; triturating the Arsenic Triiodide and Red Mercuric Iodide with 3 fl. oz. of Distilled Water until dissolved and finally making up to 20 fl. oz. with Distilled Water.

Liquor Calcii Hydroxidi.—SOLUTION OF CALCIUM HYDROXIDE. SYN. LIQUOR CALCIS; SOLUTION OF LIME; LIME WATER.

Calcium Hydroxide	1 oz.
Distilled Water.....	100 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Chloroxylenolis.—SOLUTION OF CHLOROXYLENOL. SYN. ROXENOL.

Chloroxylenol	438½ gr.
Terpineol	2 fl. oz.
Alcohol, 95%	2 fl. oz. 192 m.
Ricinoleic Acid.....	438½ gr.
Solution of Sodium Hydroxide.....	q.s.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Liquor Cresolis Saponatus.—SOLUTION OF CRESOL WITH SOAP.
SYN. LYSOL.

Cresol	10 fl. oz.
Linseed Oil, by weight	3 oz. 266 gr.
Potassium Hydroxide	368½ gr.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Potassium Hydroxide in 5 fl. oz. of Distilled Water, adding the Linseed Oil, and, after saponification is complete, adding the Cresol and sufficient Distilled Water to produce 20 fl. oz.

Liquor Epispasticus.—BLISTERING LIQUID.

Cantharidin.....	35 gr.
Castor Oil	240 m.
Colophony	105½ gr.
Acetone	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Hydrargyri Perchloridi.—SOLUTION OF MERCURIC CHLORIDE.

Mercuric Chloride	8½ gr.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Iodi Aquosus.—AQUEOUS SOLUTION OF IODINE.

Iodine	438½ gr.
Potassium Iodide	2 oz. 2 gr.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the Addendum, 1936, to the B.P., 1932, dissolving the Iodine and Potassium Iodide in 2 fl. oz. of the Distilled Water.

Liquor Iodi Fortis.—STRONG SOLUTION OF IODINE. SYN. TINCTURA IODI FORTIS; STRONG TINCTURE OF IODINE.

Iodine	2 oz. 2 gr.
Potassium Iodide	1 oz. 88½ gr.
Distilled Water.....	2 fl. oz.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Iodi Mitis.—WEAK SOLUTION OF IODINE. SYN. TINCTURA IODI MITIS; WEAK TINCTURE OF IODINE; TINCTURA IODI; TINCTURE OF IODINE.

Iodine	219½ gr.
Potassium Iodide	131½ gr.
Distilled Water.....	240 m.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Iodi Simplex.—SIMPLE SOLUTION OF IODINE.

Iodine	1 oz. 351½ gr.
Alcohol, 95%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Morphinae Hydrochloridi.—SOLUTION OF MORPHINE HYDROCHLORIDE.

Morphine Hydrochloride.....	87½ gr.
Dilute Hydrochloric Acid	192 m.
Alcohol, 90%	5 fl. oz.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Picis Carbonis.—SOLUTION OF COAL TAR.

Prepared Coal Tar, by weight	4 oz.
Quillaia, in moderately coarse powder	2 oz.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Prepared Coal Tar and the Quillaia with 16 fl. oz. of Alcohol, 90%, filtering, and finally making up to 20 fl. oz. with Alcohol, 90%.

Liquor Plumbi Subacetatis Dilutus.—DILUTE SOLUTION OF LEAD SUBACETATE. SYN. LIQUOR PLUMBI SUBACETATIS.

Strong Solution of Lead Subacetate	120 m.
Distilled Water, recently boiled and cooled, to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Plumbi Subacetatis Fortis.—STRONG SOLUTION OF LEAD SUBACETATE.

Lead Acetate	5 oz. 4½ gr.
Lead Monoxide	3 oz. 222 gr.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Lead Acetate in 15 fl. oz. of Distilled Water, adding the Lead Monoxide, allowing to stand 48 hours, filtering and finally making up to 20 fl. oz. with Distilled Water.

Liquor Quininae Ammoniatas.—AMMONIATED SOLUTION OF QUININE. SYN. TINCTURA QUININÆ AMMONIATA; AMMONIATED TINCTURE OF QUININE.

Quinine Sulphate	175½ gr.
Dilute Solution of Ammonia	2 fl. oz.
Alcohol, 60%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Liquor Sodii Chloridi Physiologicus.—PHYSIOLOGICAL SOLUTION OF SODIUM CHLORIDE. SYN. PHYSIOLOGICAL SALINE SOLUTION; NORMAL SALINE SOLUTION.

Sodium Chloride	79 gr.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the Addendum, 1936, to the B.P., 1932, modified in the Fourth Addendum thereto.

Liquor Strychninae Hydrochloridi.—SOLUTION OF STRYCHNINE HYDROCHLORIDE.

Strychnine Hydrochloride	87½ gr.
Alcohol, 90%	5 fl. oz.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Lotio Hydrargyri Nigra.—BLACK MERCURIAL LOTION. SYN. BLACK WASH.

Mercurous Chloride	61½ gr.
Glycerin	1 fl. oz.
Solution of Calcium Hydroxide	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Mel Boracis.—HONEY OF BORAX. SYN. BORAX HONEY; BORAX AND HONEY.

Borax	2 oz.
Glycerin, by weight	1 oz.
Purified Honey	17 oz.

or Borax	2 oz.
Purified Honey	18 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Mistura Magnesii Hydroxidi.—MIXTURE OF MAGNESIUM HYDROXIDE.

SYN. CREAM OF MAGNESIA.

Magnesium Sulphate	416½ gr.
Sodium Hydroxide	131½ gr.
Light Magnesium Oxide	1 oz. 23 gr.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Sodium Hydroxide in 3 fl. oz. of Distilled Water, adding the Light Magnesium Oxide, sufficient Distilled Water to produce 50 fl. oz. and pouring it into the Magnesium Sulphate dissolved in 50 fl. oz. of Distilled Water; collecting the precipitate and finally making up to 20 fl. oz. with Distilled Water.

Mistura Sennæ Composita.—COMPOUND MIXTURE OF SENNA. SYN. BLACK DRAUGHT.

Magnesium Sulphate, or Sodium Sulphate	5 oz. 5 gr.
Liquid Extract of Liquorice	1 fl. oz.
Compound Tincture of Cardamom	2 fl. oz.
Aromatic Spirit of Ammonia	1 fl. oz.
Fresh Infusion of Senna	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Magnesium Sulphate, or Sodium Sulphate, in 10 fl. oz. of the Fresh Infusion of Senna, and after adding the mixed Liquid Extract of Liquorice, Compound Tincture of Cardamom and Aromatic Spirit of Ammonia, making up to 20 fl. oz. with Fresh Infusion of Senna.

Mucilago Acaciæ.—MUCILAGE OF ACACIA. SYN. MUCILAGE OF GUM ACACIA.

Acacia	8 oz.
Chloroform Water	12 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Mucilago Tragacanthæ.—MUCILAGE OF TRAGACANTH.

Tragacanth, finely powdered	109½ gr.
Alcohol, 90%	240 m.
Chloroform Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Oculenta.—Base for Oculenta.

Yellow Soft Paraffin	9 oz.
Wool Fat	1 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Oxymel.—OXYMEL.

Acetic Acid	3 fl. oz.
Distilled Water	3 fl. oz.
Purified Honey	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Oxymel Scillæ.—OXYMEL OF SQUILL.

Squill, or Indian Squill, bruised	1 oz.
Acetic Acid	1 fl. oz. 384 m.
Distilled Water	5 fl. oz.
Purified Honey	q.s.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Squill, or Indian Squill, in the Acetic Acid and Distilled Water, and to every three volumes of the resulting preparation adding seven volumes of Purified Honey.

Pasta Acidi Tannici.—PASTE OF TANNIC ACID. SYN. TANNIC ACID JELLY.

Tannic Acid	1 oz. 1 gr.
Tragacanth, finely powdered	175½ gr.
Chlorocresol	8½ gr.
Alcohol, 95%	1 fl. oz. 96 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Third Addendum to the B.P., 1932; dissolving the Chlorocresol in 18 fl. oz. of Distilled Water, adding the Tannic Acid; mixing the Tragacanth with the Alcohol, 95%, and adding the solution of Chlorocresol and Tannic Acid as directed; making the final volume up to 20 fl. oz. with Distilled Water.

Pasta Zinci Oxidi Composita.—COMPOUND PASTE OF ZINC OXIDE.**SYN. ZINC PASTE.**

Zinc Oxide, finely sifted	1 oz.
Starch, finely sifted	1 oz.
Soft Paraffin, white	2 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Phenol Liquefactum.—LIQUEFIED PHENOL. SYN. ACIDUM CARBOLICUM LIQUEFACTUM.

Phenol	8 oz.
Distilled Water, by weight	to 10 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pilula Aloes.—PILL OF ALOES. SYN. ALOES PILL.

Aloes, in fine powder	2 oz.
Hard Soap, in fine powder	1 oz.
Oil of Caraway	50 m.
Syrup of Liquid Glucose	151 gr. or q.s.

Prepare in accordance with the directions given in the B.P., 1932.

EQUIVALENT B.P. FORMULÆ

Pilula Aloes et Asafœtidæ.—PILL OF ALOES AND ASAFETIDA.

Aloes, in fine powder	1½ oz.
Asafetida	1½ oz.
Hard Soap, in fine powder	1½ oz.
Syrup of Liquid Glucose	½ oz. or q.s.

Prepare in accordance with the directions given in the B.P., 1932.

Pilula Aloes et Ferri.—PILL OF ALOES AND IRON.

Exsiccated Ferrous Sulphate	1 oz.
Aloes, in fine powder	2 oz.
Cinnamon, in fine powder	1 oz. 87½ gr.
Cardamom, in fine powder	1 oz. 87½ gr.
Ginger, in fine powder	1 oz. 87½ gr.
Syrup of Liquid Glucose	3 oz. 175 gr. or q

Prepare in accordance with the directions given in the B.P., 1932.

Pilula Colocynthis et Hyoscyami.—PILL OF COLOCYNTH AND HYOSCYAMUS.

Colocynth, in fine powder	1½ oz.
Aloes, in fine powder	2½ oz.
Scammony Resin, in fine powder	2½ oz.
Curd Soap, in fine powder	306½ gr.
Oil of Clove	192 m.
Dry Extract of Hyoscyamus	1½ oz.
Syrup of Liquid Glucose	1 oz. 175 gr. or q.s.

Prepare in accordance with the directions given in the B.P., 1932.

Pilula Ferri Carbonatis.—PILL OF IRON CARBONATE. SYN. BLAUD'S PILL; PILULA FERRI; IRON PILL.

Exsiccated Ferrous Sulphate	3 oz. 175 gr.
Exsiccated Sodium Carbonate	2 oz. 70 gr.
Tragacanth, finely powdered	87½ gr.
Acacia, finely powdered	367½ gr.
Liquid Glucose	3 oz. 87½ gr.
Distilled Water	96 m.

Prepare in accordance with the directions given in the B.P., 1932.

Pilula Hydrargyri.—PILL OF MERCURY. SYN. MERCURY PILL; BLUE PILL.

Mercury	3 oz. 131 gr.
Syrup	1 oz. 175 gr.
Liquid Glucose	1 oz. 219 gr.
Glycerin, by weight	219 gr.
Liquorice, in fine powder	3 oz. 131 gr.

Prepare in accordance with the directions given in the B.P., 1932; mixing the Syrup, Liquid Glucose, Glycerin and 1 oz. 219 gr. of the Liquorice in a mortar, adding the Mercury and when incorporated, adding the remainder of the Liquorice.

Pilula Rhei Composita.—COMPOUND PILL OF RHUBARB. SYN. COMPOUND RHUBARB PILL.

Rhubarb, in fine powder	2½ oz.
Aloes, in fine powder	2 oz.
Myrrh	1 oz. 175 gr.
Hard Soap, in fine powder	1 oz. 175 gr.
Oil of Peppermint	96 m.
Syrup of Liquid Glucose	2½ oz. or q.s.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Cretæ Aromaticus.—AROMATIC POWDER OF CHALK.

Chalk, finely powdered	6½ oz.
Cinnamon, finely powdered	2½ oz.
Nutmeg, finely powdered	2 oz.
Clove, finely powdered	1 oz.
Cardamom, finely powdered	¾ oz.
Sucrose, finely powdered	12½ oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Cretæ Aromaticus cum Opio.—AROMATIC POWDER OF CHALK WITH OPIUM.

Aromatic Powder of Chalk	9¾ oz.
Powdered Opium	¼ oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Effervescens Compositus.—COMPOUND EFFERVESCENT POWDER. SYN. PULVIS SODÆ TARTARATÆ EFFERVESCENS; EFFERVESCENT TARTARATED SODA POWDER; SEIDLITZ POWDER.

No. 1	Sodium Potassium Tartrate, in dry powder	115½ gr.
	Sodium Bicarbonate, in dry powder	38½ gr.
No. 2	Tartaric Acid, in dry powder	38½ gr.

Prepare in accordance with the directions given in the B.P., 1932, wrapping No. 1 in blue paper and No. 2 in white paper.

Pulvis Glycyrrhizæ Compositus.—COMPOUND POWDER OF LIQUORICE.

Senna Leaf, finely powdered	2 oz.
Liquorice, peeled, finely powdered	2 oz.
Fennel, finely powdered	1 oz.
Sublimed Sulphur	1 oz.
Sucrose, finely powdered	6½ oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Ipecacuanhæ et Opii.—POWDER OF IPECACUANHA AND OPIUM. SYN. PULVIS OPII ET IPECACUANHÆ COMPOSITUS I.A.; PULVIS IPECACUANHÆ COMPOSITUS; COMPOUND POWDER OF IPECACUANHA; DOVER'S POWDER.

Powdered Ipecacuanha	1 oz.
Powdered Opium	1 oz.
Lactose, finely powdered	8 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Jalapæ Compositus.—COMPOUND POWDER OF JALAP.

Powdered Jalap.....	3 oz.
Potassium Acid Tartrate, finely powdered..	6 oz.
Ginger, finely powdered	1 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Rhei Compositus.—COMPOUND POWDER OF RHUBARB. SYN. GREGORY'S POWDER.

Rhubarb, finely powdered	2½ oz.
Heavy Magnesium Carbonate	3½ oz.
Light Magnesium Carbonate	3½ oz.
Ginger, finely powdered	1 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Pulvis Tragacanthæ Compositus.—COMPOUND POWDER OF TRAGACANTH.

Tragacanth, finely powdered	1½ oz.
Acacia, finely powdered	2 oz.
Starch, finely powdered	2 oz.
Sucrose, finely powdered	4½ oz.

Prepare in accordance with the directions given in the B.P., 1932.

Sodii Phosphas Effervescens.—EFFERVESCENT SODIUM PHOSPHATE.

Sodium Phosphate	5 oz.
Sodium Bicarbonate, finely powdered	5 oz.
Tartaric Acid, finely powdered	2 oz. 175 gr.
Citric Acid, finely powdered	2 oz. 43½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Sodii Sulphas Effervescens.—EFFERVESCENT SODIUM SULPHATE.

Sodium Sulphate	5 oz.
Sodium Bicarbonate, finely powdered	5 oz.
Tartaric Acid, finely powdered	2 oz. 175 gr.
Citric Acid, finely powdered	2 oz. 43½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Spiritus Ætheris.—SPIRIT OF ETHER.

Ether.....	3 fl. oz. 144 m.
Alcohol, 90%	to 10 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Spiritus Ammoniaë Aromaticus.—AROMATIC SPIRIT OF AMMONIA.

SYN. SPIRIT OF SAL VOLATILE.

Ammonium Carbonate	219½ gr.
Strong Solution of Ammonia	1 fl. oz.
Oil of Lemon	48 m.
Oil of Nutmeg	28½ m.
Alcohol, 90%	15 fl. oz.
Distilled Water.....	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; placing the Oil of Lemon, Oil of Nutmeg, and Alcohol, 90%, with 7½ fl. oz. of Distilled Water in a still, distilling 17½ fl. oz. and an additional 1 fl. oz. 48 m.; placing the latter with the Ammonium Carbonate and the

Strong Solution of Ammonia in a bottle of rather more than 2½ fl. oz. capacity and after dissolving and filtering as directed, mixing it with the first distillate and adding sufficient Distilled Water to produce 20 fl. oz.

Spiritus Cajuputi.—SPIRIT OF CAJUPUT.

Oil of Cajuput	1 fl. oz.
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Alcohol, 90% to 10 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Spiritus Camphoræ.—SPIRIT OF CAMPHOR.

Camphor	1 oz.
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Alcohol, 90%.to 10 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Spiritus Chloroformi.—SPIRIT OF CHLOROFORM.

Chloroform	1 fl. oz.
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Alcohol, 90%	to 20 fl. oz.
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Prepare in accordance with the directions given in the B.P., 1932.

Spiritus Menthæ Piperitæ.—SPIRIT OF PEPPERMINT. SYN. ESSENCE OF PEPPERMINT.

Oil of Peppermint	2 fl. oz.
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Alcohol, 90%	to 20 fl. oz.
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Prepare in accordance with the directions given in the B.P., 1932.

Suppositorium Glycerini.—SUPPOSITORY OF GLYCERIN.

Gelatin, cut small 1 oz.

Glycerin, by weight	5 oz.
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Distilled Water.....	q.s.
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Prepare in accordance with the directions given in the B.P., 1932; making the final weight of the mixture equal to 7 oz. 62 gr.

Syrupus.—**SYRUP.**

Sucrose 13 oz. 145 $\frac{3}{4}$ gr.

Distilled Water, by weight, to 20 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Syrupus Aurantii.—**SYRUP OF ORANGE**

Concentrated Tincture of Orange..... 288 m.

Syrup	to	20 fl. oz.
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Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932.

Syrupus Ferri Iodidi.—**SYRUP OF FERROUS IODIDE.** SYN. SIRUPUS FERROSI IODIDI CONCENTRATUS I.A.

Iron	1664 gr.
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Iodine	100½ gr.
Iodine	1 oz. 71 gr.

Dilute Hypophosphorous Acid	96 m
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Distilled Water.....	q.s.
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Syrup.....to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; adding the Iron and Iodine to 1 fl. oz. 384 m. of Distilled Water and when the reaction is completed, filtering as directed, making up the volume of the filtrate to 2½ fl. oz. and finally adding Syrup to produce 20 fl. oz.

Syrupus Ferri Phosphatis Compositus.—COMPOUND SYRUP OF FERROUS PHOSPHATE. SYN. PARRISH'S FOOD; PARRISH'S SYRUP; CHEMICAL FOOD.

Iron	37½ gr.
Phosphoric Acid	460½ m.
Calcium Carbonate	119½ gr.
Potassium Bicarbonate	8½ gr.
Sodium Phosphate	8½ gr.
Cochineal	30½ gr.
Sucrose	14 oz.
Orange-flower Water, of commerce, undiluted	1 fl. oz.
Distilled Water.....to	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; diluting 192 m. of the Phosphoric Acid with 240 m. of Distilled Water, adding the Iron and dissolving as directed, adding the solution to the Calcium Carbonate, Potassium Bicarbonate and Sodium Phosphate previously triturated with the remainder of the Phosphoric Acid and 1 fl. oz. 288 m. of Distilled Water; boiling the Cochineal with 7½ fl. oz. of Distilled Water for fifteen minutes, adding the Sucrose, again boiling for fifteen minutes, straining and making up to 16 fl. oz. as directed; filtering into the resulting syrup the solution of Iron, Calcium, Potassium, and Sodium Phosphates, adding the Orange-flower Water and sufficient Distilled Water to make 20 fl. oz.

Syrupus Ferri Phosphatis cum Quinina et Strychnina.—SYRUP OF FERROUS PHOSPHATE WITH QUININE AND STRYCHNINE. SYN. EASTON'S SYRUP.

Iron	75½ gr.
Phosphoric Acid.....	384 m.
Strychnine Hydrochloride	2½ gr.
Quinine Sulphate	129½ gr.
Syrup.....	11 fl. oz. 96 m.
Glycerin	2 fl. oz. 384 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; diluting the Phosphoric Acid with 1 fl. oz. 288 m. of Distilled Water, adding it to the Iron and dissolving as directed, then adding the solution to the Strychnine Hydrochloride and Quinine Sulphate triturated with 288 m. of Distilled Water, making up the solution to 5 fl. oz. with Distilled Water and filtering it into the mixed Syrup and Glycerin, finally making up to 20 fl. oz. with Distilled Water.

Syrupus Ferri Phosphatis cum Strychnina.—SYRUP OF FERROUS PHOSPHATE WITH STRYCHNINE. SYN. EASTON'S SYRUP WITHOUT QUININE.

Iron	75½ gr.
Phosphoric Acid	384 m.
Strychnine Hydrochloride	2½ gr.
Syrup	11 fl. oz. 96 m.
Glycerin	2 fl. oz. 384 m.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Syrupus Glucosi Liquid.—**SYRUP OF LIQUID GLUCOSE.** SYN. SYRUPUS GLUCOSI; SYRUP OF GLUCOSE.

Liquid Glucose	5 oz.
Syrup	10 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Syrupus Limonis.—**SYRUP OF LEMON.**

Lemon Peel, in thin slices	1 oz. 88½ gr.
Alcohol, 60%	q.s.
Citric Acid	210½ gr.
Syrup	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Lemon Peel in 1 fl. oz. 192 m. of Alcohol, 60%, pressing, filtering, and making up the filtrate to 2 fl. oz. with Alcohol, 60%, as directed; dissolving the Citric Acid in the liquid and adding Syrup to produce 20 fl. oz.

Syrupus Pruni Serotinæ.—**SYRUP OF WILD CHERRY.** SYN. SYRUPUS PRUNI VIRGINIANÆ; SYRUP OF VIRGINIAN PRUNE.

Wild Cherry Bark, in moderately coarse powder	3 oz.
Sucrose	16 oz.
Glycerin	1 fl. oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; mixing the Glycerin with 4 fl. oz. of Distilled Water, moistening the Wild Cherry Bark with 2 fl. oz. of the mixture, percolating as directed onto the Sucrose so as to obtain 20 fl. oz. of finished Syrup of Wild Cherry.

or Wild Cherry Bark, in moderately coarse powder	3 oz.
Tragacanth, finely powdered	61½ gr.
Chloroform	48 m.
Alcohol, 90%	192 m.
Soluble Saccharin	14 gr.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932; moistening the Wild Cherry Bark with 2 fl. oz. of Distilled Water, percolating as directed until 9 fl. oz. of percolate are obtained, diluting with Distilled Water to 19 fl. oz., adding the other ingredients as directed and finally adding Distilled Water to produce 20 fl. oz.

Syrupus Scillæ.—**SYRUP OF SQUILL.**

Vinegar of Squill	9 fl. oz.
Sucrose	16 oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Syrupus Sennæ.—SYRUP OF SENNA.

Liquid Extract of Senna	5 fl. oz.
Oil of Coriander	14½ m.
Sucrose	14 oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; mixing the Oil of Coriander with the Liquid Extract of Senna, adding 6 fl. oz. of Distilled Water, making up the filtrate to 11 fl. oz. with Distilled Water, and after dissolving the Sucrose making up to 20 fl. oz. with Distilled Water.

Syrupus Tolutanus.—SYRUP OF TOLU. SYN. SYRUP OF BALSAM OF TOLU.

Balsam of Tolu	½ oz.
Sucrose	13½ oz.
Distilled Water	to 20 oz. by weight.

Prepare in accordance with the directions given in the B.P., 1932; adding 8 fl. oz. of Distilled Water to the Balsam of Tolu, boiling and adjusting the weight as directed to 7½ oz., filtering and dissolving the Sucrose in the filtrate, finally adding Distilled Water to produce 20 oz. by weight.

Syrupus Zingiberis.—SYRUP OF GINGER.

Strong Tincture of Ginger	1 fl. oz.
Syrup	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Tinctura Asafœtidæ.—TINCTURE OF ASAFETIDA.

Asafetida, bruised	4 oz.
Alcohol, 70%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Asafetida with 15 fl. oz. of Alcohol, 70%, and finally adding Alcohol, 70%, to produce 20 fl. oz.

Tinctura Aurantii.—TINCTURE OF ORANGE.

Fresh Bitter-Orange Peel, in thin slices ...	5 oz.
Alcohol, 90%	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Aurantii Concentrata.—CONCENTRATED TINCTURE OF ORANGE.

Fresh Bitter-Orange Peel, in thin slices	20 oz.
Alcohol, 90%	20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; by the maceration process.

Tinctura Benzoini Composita.—COMPOUND TINCTURE OF BENZOIN.

SYN. FRIARS' BALSAM.

Benzoin, crushed	2 oz.
Storax	1½ oz.
Balsam of Tolu	½ oz.
Aloes	175 gr.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Benzoin, Storax, Balsam of Tolu, and Aloes, with 16 fl. oz. of Alcohol, 90%, and finally making up to 20 fl. oz. with Alcohol, 90%.

Tinctura Calumbæ.—TINCTURE OF CALUMBA.

Calumba, in moderately coarse powder ... 2 oz.
Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Capsici.—TINCTURE OF CAPSICUM.

Capsicum, in moderately coarse powder .. 1 oz.
Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Capsici Concentrata.—CONCENTRATED TINCTURE OF CAPSICUM.

Capsicum, in moderately coarse powder.. 4 oz.
Alcohol, 60% 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; by the maceration process.

Tinctura Cardamomi Composita.—COMPOUND TINCTURE OF CARDAMOM.

Cardamom, in moderately coarse powder.. 122½ gr.
Caraway, in moderately coarse powder... 122½ gr.
Cinnamon, in moderately coarse powder .. 245½ gr.
Cochineal, in moderately coarse powder .. 61½ gr.
Glycerin 1 fl. oz.
Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; producing 18 fl. oz. of tincture by the percolation process, adding the Glycerin and sufficient Alcohol to produce 20 fl. oz.

Note: Glycerin may be omitted in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Tinctura Cardamomi Composita Concentrata.—CONCENTRATED COMPOUND TINCTURE OF CARDAMOM.

Cardamom, in moderately coarse powder.. 1 oz. 53½ gr.
Caraway, in moderately coarse powder... 1 oz. 53½ gr.
Cinnamon, in moderately coarse powder .. 2 oz. 107½ gr.
Cochineal, in moderately coarse powder .. 245½ gr.
Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; by the percolation process.

Tinctura Catechu.—TINCTURE OF CATECHU.

Catechu, crushed 4 oz.
Cinnamon, bruised 1 oz.
Alcohol, 45% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Cinchonæ.—TINCTURE OF CINCHONA.

Extract of Cinchona	2 oz.
Alcohol, 70%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Tinctura Cinchonæ Composita.—COMPOUND TINCTURE OF CINCHONA.

Extract of Cinchona	1 oz.
Dried Bitter-Orange Peel, bruised	1 oz.
Serpentary, in moderately fine powder	$\frac{1}{2}$ oz.
Cochineal, in moderately coarse powder ..	26 gr.
Alcohol, 70%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Bitter-Orange Peel, Serpentry, and Cochineal with 18 fl. oz. of Alcohol, 70%, dissolving the Extract of Cinchona in the resulting liquid, and finally adding Alcohol, 70%, to produce 20 fl. oz.

Tinctura Cinchonæ Composita Concentrata.—CONCENTRATED COMPOUND TINCTURE OF CINCHONA.

Extract of Cinchona	4 oz.
Dried Bitter-Orange Peel, bruised	4 oz.
Serpentary, in moderately fine powder ..	2 oz.
Cochineal, in moderately coarse powder ..	105 gr.
Alcohol, 70%	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; dissolving the Extract of Cinchona in 16 fl. oz. of a tincture made by the maceration or percolation process from the Dried Bitter-Orange Peel, Serpentry and Cochineal and adding Alcohol, 70%, to produce 20 fl. oz.

Tinctura Cocci.—TINCTURE OF COCHINEAL.

Cochineal, in moderately coarse powder ..	2 oz.
Alcohol, 45%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Digitalis.—TINCTURE OF DIGITALIS.

Method 2. Preparation from Powdered Digitalis (Digitalis Pulverata).

Powdered Digitalis, a quantity containing the equivalent of 350 $\frac{1}{2}$ gr. of the international standard digitalis powder.	
Alcohol, 70%	to 10 fl. oz.

Prepare in accordance with the directions given in the First Addendum to the B.P., 1932; by a maceration process.

Tinctura Gentianæ Composita.—COMPOUND TINCTURE OF GENTIAN.

Gentian, cut small and bruised	2 oz.
Dried Bitter-Orange Peel, bruised	$\frac{3}{4}$ oz.
Cardamom, bruised	$\frac{1}{4}$ oz.
Alcohol, 45%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Gentianæ Composita Concentrata.—CONCENTRATED COMPOUND TINCTURE OF GENTIAN.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; by making 80 fl. oz. of Compound Tincture of Gentian, distilling under reduced pressure, dissolving the soft extract in the first 10 fl. oz. of distillate and adding Alcohol, 45%, to produce 20 fl. oz.

Tinctura Ipecacuanhæ.—TINCTURE OF IPECACUANHA.

Liquid Extract of Ipecacuanha	1 fl. oz.
Dilute Acetic Acid	158½ m.
Alcohol, 90%	4 fl. oz.
Glycerin	4 fl. oz.
Distilled Water	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; mixing the Alcohol, 90%, and the Dilute Acetic Acid with the Glycerin and 10 fl. oz. of Distilled Water, adding the Liquid Extract of Ipecacuanha and sufficient Distilled Water to produce 20 fl. oz.

Note: Glycerin may be omitted in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Tinctura Krameriz.—TINCTURE OF KRAMERIA.

Krameria, in moderately coarse powder ..	4 oz.
Alcohol, 60%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the percolation process.

Tinctura Limonis.—TINCTURE OF LEMON.

Lemon Peel, in thin slices	5 oz.
Alcohol, 60%	20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Limonis Concentrata.—CONCENTRATED TINCTURE OF LEMON.

Lemon Peel, in thin slices	20 oz.
Alcohol, 90%	20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; by the maceration process.

Tinctura Lobeliæ Ætherea.—ETHEREAL TINCTURE OF LOBELIA.

Lobelia, in moderately coarse powder	4 oz.
Spirit of Ether	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; collecting 15 fl. oz. of percolate, pressing the marc and finally making up to 20 fl. oz. with Spirit of Ether.

Tinctura Lobeliæ Ætherea Concentrata.—CONCENTRATED ETHEREAL TINCTURE OF LOBELIA.

Lobelia, in moderately coarse powder	16 oz.
Spirit of Ether	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; collecting 10 fl. oz. of percolate, pressing the marc and finally making up to 20 fl. oz. with Spirit of Ether.

Tinctura Myrrhæ.—TINCTURE OF MYRRH.

Myrrh, crushed 4 oz.
 Alcohol, 90% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; macerating the Myrrh in 16 fl. oz. of Alcohol, 90%, and finally making up to 20 fl. oz. with Alcohol, 90%, as directed.

Tinctura Nucis Vomicae.—TINCTURE OF NUX VOMICA.

Liquid Extract of Nux Vomica 1 fl. oz. 320½ m.
 Alcohol, 90% 10 fl. oz.
 Distilled Water to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Tinctura Opii Camphorata.—CAMPHORATED TINCTURE OF OPIUM.

SYN. TINCTURA OPII BENZOICA I.A.; TINCTURA CAMPHORÆ COMPOSITA; COMPOUND TINCTURE OF CAMPHOR; PAREGORIC.

Tincture of Opium 1 fl. oz.
 Benzoic Acid 43½ gr.
 Camphor 26½ gr.
 Oil of Anise 28½ m.
 Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Benzoic Acid, Camphor, and Oil of Anise, in 18 fl. oz. of Alcohol, 60%, adding the Tincture of Opium and making up to 20 fl. oz. with Alcohol, 60%.

Tinctura Opii Camphorata Concentrata.—CONCENTRATED CAMPHORATED TINCTURE OF OPIUM. SYN. LIQUOR OPII CAMPHORATUS CONCENTRATUS; CONCENTRATED CAMPHORATED SOLUTION OF OPIUM.

Tincture of Opium 8 fl. oz.
 Benzoic Acid 350½ gr.
 Camphor 210½ gr.
 Oil of Anise 230½ m.
 Alcohol, 95% 8 fl. oz.
 Distilled Water to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932.

Tinctura Quassiae.—TINCTURE OF QUASSIA.

Quassia, rasped 2 oz.
 Alcohol, 45% 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Quassiae Concentrata.—CONCENTRATED TINCTURE OF QUASSIA.

Quassia, in moderately coarse powder 8 oz.
 Alcohol, 45% to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932.

Tinctura Quillaia.—TINCTURE OF QUILLAIA.

Quillaia, in moderately coarse powder . . . 1 oz.
 Alcohol, 45% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the percolation process.

Tinctura Rhei Composita.—COMPOUND TINCTURE OF RHUBARB.

Rhubarb, in moderately coarse powder . . . 2 oz.
 Cardamom, in moderately coarse powder . . ½ oz.
 Coriander, in moderately coarse powder . . ½ oz.
 Glycerin 2 fl. oz.
 Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; preparing 17 fl. oz. of tincture by the percolation process, adding the Glycerin and sufficient Alcohol, 60%, to produce 20 fl. oz.

Note: Glycerin may be omitted in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Tinctura Scilla.—TINCTURE OF SQUILL.

Squill, or Indian Squill, bruised 2 oz.
 Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Senega.—TINCTURE OF SENEGA.

Liquid Extract of Senega 4 fl. oz.
 Alcohol, 60% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Tinctura Stramonii.—TINCTURE OF STRAMONIUM.

Liquid Extract of Stramonium 2 fl. oz.
 Alcohol, 45% to 20 fl. oz.

Prepare in accordance with the directions given in the Addendum, 1936, to the B.P., 1932.

Tinctura Tolutana.—TINCTURE OF TOLU. SYN. TINCTURE OF BALSAM OF TOLU.

Balsam of Tolu 2 oz.
 Alcohol, 90% to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; dissolving the Balsam of Tolu in 16 fl. oz. of Alcohol, 90%, and finally adding sufficient Alcohol, 90%, to make 20 fl. oz.

Tinctura Tolutana Concentrata.—CONCENTRATED TINCTURE OF TOLU. SYN. CONCENTRATED TINCTURE OF BALSAM OF TOLU.

Balsam of Tolu 8 oz.
 Alcohol, 90% to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932; dissolving the Balsam of Tolu in 12 fl. oz. of Alcohol, 90%, filtering and washing the filter with sufficient alcohol, 90%, to make 20 fl. oz.

Tinctura Valerianæ Ammoniata.—AMMONIATED TINCTURE OF VALERIAN.

Valerian, or Indian Valerian, in moderately coarse powder	4 oz.
Oil of Nutmeg	28½ m.
Oil of Lemon	19¼ m.
Dilute Solution of Ammonia	2 fl. oz.
Alcohol, 60%	18 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the maceration process.

Tinctura Valerianæ Ammoniata Concentrata.—CONCENTRATED AMMONIATED TINCTURE OF VALERIAN.

Valerian, or Indian Valerian, in moderately coarse powder	16 oz.
Oil of Nutmeg	115¼ m.
Oil of Lemon	76½ m.
Strong Solution of Ammonia	2 fl. oz. 320 m.
Alcohol, 60%	to 20 fl. oz.

Prepare in accordance with the directions given in the Fifth Addendum to the B.P., 1932.

Tinctura Zingiberis Fortis.—STRONG TINCTURE OF GINGER. SYN. ESSENCE OF GINGER.

Ginger, in moderately coarse powder	10 oz.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932; by the percolation process.

Tinctura Zingiberis Mitis.—WEAK TINCTURE OF GINGER. SYN. TINCTURA ZINGIBERIS; TINCTURE OF GINGER.

Strong Tincture of Ginger	4 fl. oz.
Alcohol, 90%	to 20 fl. oz.

Prepare in accordance with the directions given in the B.P., 1932.

Trochisci—Lozenge Basis of the General Process

Sucrose, finely powdered	35 oz. 120 gr.
Acacia, finely powdered	2 oz. 205 gr.
Tincture of Tolu	338 m.
Distilled Water	q.s.

To be prepared and used in accordance with the directions given in the B.P., 1932, in the preparation of 1,000 lozenges.

Trochiscus Acidi Tannici.—LOZENGE OF TANNIC ACID. SYN. TANNIC ACID LOZENGE.

Tannic Acid	463 gr.
Lozenge Basis of the General Process for 1,000 Lozenges.	

Prepare in accordance with the directions given in the B.P., 1932.

Trochiscus Bismuthi Compositus.—COMPOUND LOZENGE OF BISMUTH. SYN. COMPOUND BISMUTH LOZENGE.

Bismuth Carbonate	5 oz. 127 gr.
Heavy Magnesium Carbonate	5 oz. 127 gr.
Calcium Carbonate	10 oz. 254 gr.
Acacia, finely powdered	2 oz. 205 gr.

- Sucrose, finely powdered 35 oz. 120 gr.
 Oil of Rose, of commerce 1 m.
 Distilled Water..... q.s.
 Prepare in accordance with the directions given in the B.P., 1932;
 dividing into 1,000 equal lozenges.
- Trochiscus Krameriae.**—LOZENGE OF KRAMERIA. SYN. KRAMERIA
 LOZENGE.
 Dry Extract of Krameria, finely powdered 2 oz. 51 gr.
 Lozenge Basis of the General Process for 1,000 Lozenges.
 Prepare in accordance with the directions given in the B.P., 1932.
- Trochiscus Krameriae et Cocainae.**—LOZENGE OF KRAMERIA AND
 COCAINE. SYN. KRAMERIA AND COCAINE LOZENGE.
 Dry Extract of Krameria, finely powdered 2 oz. 51 gr.
 Cocaine Hydrochloride 46½ gr.
 Lozenge Basis of the General Process for 1,000 Lozenges.
 Prepare in accordance with the directions given in the B.P., 1932.
- Trochiscus Morphinae et Ipecacuanhae.**—LOZENGE OF MORPHINE
 AND IPECACUANHA. SYN. MORPHINE AND IPECACUANHA LOZENGE.
 Morphine Hydrochloride 30½ gr.
 Powdered Ipecacuanha 92½ gr.
 Lozenge Basis of the General Process for 1,000 Lozenges.
 Prepare in accordance with the directions given in the B.P., 1932.
- Trochiscus Phenolis.**—LOZENGE OF PHENOL. SYN. TROCHISCUS ACIDI
 CARBOLICI; PHENOL LOZENGE; CARBOLIC ACID LOZENGE.
 Liquefied Phenol 600 m.
 Acacia, finely powdered 3 oz. 76 gr.
 Tragacanth, finely powdered 1 oz. 25 gr.
 Citric Acid, finely powdered 108 gr.
 Carmine, of commerce 46½ gr.
 Sucrose, finely powdered 35 oz. 120 gr.
 Distilled Water..... q.s.
 Prepare in accordance with the directions given in the B.P., 1932;
 dividing into 1,000 equal lozenges.
- Unguentum Acidi Borici.**—OINTMENT OF BORIC ACID. SYN. BORIC
 ACID OINTMENT.
 Boric Acid, finely sifted 44 gr.
 Hydrous Ointment 9 oz. 393½ gr.
 Prepare in accordance with the directions given in the Sixth
 Addendum to the B.P., 1932.
- Unguentum Acidi Salicylici.**—OINTMENT OF SALICYLIC ACID. SYN.
 SALICYLIC ACID OINTMENT.
 Salicylic Acid, finely sifted 62½ gr.
 Hydrous Ointment 7 oz.
 Prepare in accordance with the directions given in the Sixth
 Addendum to the B.P., 1932.
- Unguentum Acidi Tannici.**—OINTMENT OF TANNIC ACID. SYN.
 TANNIC ACID OINTMENT.
 Tannic Acid 2 oz.
 Distilled Water..... 4 fl. oz.
 Ointment of Wool Alcohols 4 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Alcoholium Lanæ.—OINTMENT OF WOOL ALCOHOLS.

Wool Alcohols	1 oz.
Hard Paraffin	4 oz.
White Soft Paraffin or Yellow Soft Paraffin	1 oz. 292 gr.
Liquid Paraffin	10 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Aquosum.—HYDROUS OINTMENT.

Ointment of Wool Alcohols	5 oz.
Distilled Water	5 fl. oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Capsici.—OINTMENT OF CAPSICUM. SYN. CAPSICUM OINTMENT.

Capsicum, bruised	2½ oz.
Lard	1 oz.
Hard Paraffin	1 oz.
Yellow Soft Paraffin	7½ oz.

or Capsicum, bruised	2½ oz.
Simple Ointment, prepared with Yellow Soft Paraffin	9½ oz.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Chrysarobini.—OINTMENT OF CHRYSAROBIN. SYN. CHRYSAROBIN OINTMENT.

Chrysarobin, finely sifted	1 oz.
Simple Ointment	24 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Dithranolis.—OINTMENT OF DITHRANOL.

Dithranol	4½ gr.
Yellow Soft Paraffin	9 oz. 433 gr.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Hamamelidis.—OINTMENT OF HAMAMELIS.

Liquid Extract of Hamamelis	1 fl. oz.
Distilled Water	4 fl. oz.
Ointment of Wool Alcohols	5 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Hydrargyri.—OINTMENT OF MERCURY.

Mercury	3 oz.
Oleated Mercury	65½ gr.
Wool Fat	4 oz. 131½ gr.
White Beeswax	306½ gr.
White Soft Paraffin	1 oz. 372 gr.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Hydrargyri Ammoniat.—OINTMENT OF AMMONIATED MERCURY. SYN. AMMONIATED MERCURY OINTMENT; WHITE PRECIPITATE OINTMENT.

Ammoniated Mercury, finely powdered .. 44 gr.
Hydrous Ointment 9 oz. 393½ gr.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Hydrargyri Compositum.—COMPOUND OINTMENT OF MERCURY. SYN. COMPOUND MERCURY OINTMENT.

Mercury Ointment 4 oz.
Yellow Beeswax 2 oz. 175 gr.
Olive Oil, Arachis Oil, Cotton Seed Oil *or*
Sesame Oil 2 oz. 175 gr.
Camphor 1 oz. 87½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Hydrargyri Dilutum.—DILUTE OINTMENT OF MERCURY.

Ointment of Mercury 3 oz.
Simple Ointment 6 oz.

Prepare in accordance with the directions given in the Fourth Addendum to the B.P., 1932.

Unguentum Hydrargyri Nitratis Dilutum.—DILUTE OINTMENT OF MERCURIC NITRATE. SYN. DILUTED MERCURIC NITRATE OINTMENT.

Strong Ointment of Mercuric Nitrate 1 oz.
Yellow, Soft Paraffin 4 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Hydrargyri Nitratis Forte.—STRONG OINTMENT OF MERCURIC NITRATE. SYN. UNGUENTUM HYDRARGYRI NITRATIS; MERCURIC NITRATE OINTMENT.

Mercury 1 oz.
Nitric Acid 3 fl. oz.
Lard 4 oz.
Olive Oil, *or* Arachis Oil 7 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Hydrargyri Oleati.—OINTMENT OF OLEATED MERCURY. SYN. MERCURIC OLEATE OINTMENT.

Oleated Mercury 2½ oz.
Hydrous Ointment 7½ oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Hydrargyri Subchloridi.—OINTMENT OF MERCUROUS CHLORIDE. SYN. MERCUROUS CHLORIDE OINTMENT; CALOMEL OINTMENT.

Mercurous Chloride 1 oz.
Hydrous Ointment 4 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Paraffini.—PARAFFIN OINTMENT.

White Beeswax	1 oz.
Hard Paraffin	4 oz.
White Soft Paraffin or Yellow Soft Paraffin	45 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Phenolis.—OINTMENT OF PHENOL. SYN. UNGUENTUM ACIDI CARBOLICI; PHENOL OINTMENT.

Phenol	131½ gr.
White Beeswax	2 oz.
Lard	2 oz.
Hard Paraffin	2 oz.
White Soft Paraffin	7 oz. 306½ gr.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Simplex.—SIMPLE OINTMENT.

Wool Fat	1 oz.
Hard Paraffin	2 oz.
White Soft Paraffin or Yellow Soft Paraffin	17 oz.

Prepare in accordance with the directions given in the B.P., 1932.

Unguentum Sulphuris.—OINTMENT OF SULPHUR. SYN. SULPHUR OINTMENT.

Sublimed Sulphur, finely sifted	1 oz.
Hydrous Ointment	9 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Zinci Oleatis.—OINTMENT OF ZINC OLEATE. SYN. ZINC OLEATE OINTMENT.

Zinc Sulphate	1 oz.
Hard Soap, in shavings	3 oz.
Distilled Water, boiling	q.s.
Hydrous Ointment	q.s.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932; dissolving the Zinc Sulphate in 2 fl. oz. of Distilled Water, the Hard Soap in 20 fl. oz. of Distilled Water, preparing the Zinc Oleate as directed and mixing it with an equal weight of Hydrous Ointment.

Unguentum Zinci Oxidi.—OINTMENT OF ZINC OXIDE. SYN. UNGUENTUM ZINCI; ZINC OINTMENT.

Zinc Oxide, finely sifted	3 oz.
Hydrous Ointment	17 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

Unguentum Zinci Oxidi Anhydrosu.—ANHYDROUS OINTMENT OF ZINC OXIDE.

Zinc Oxide, finely sifted	3 oz.
Simple Ointment	17 oz.

Prepare in accordance with the directions given in the Sixth Addendum to the B.P., 1932.

PROPORTIONS OF ACTIVE INGREDIENTS IN PREPARATIONS OF THE B.P.

Aconite	
Lin. Aconit.	50 per cent. w/v aconite root.
Adrenaline	
Liq. Adrenal. Hydroch. ...	0·1 per cent. w/v adrenaline.
Arsenic Triiodide	
Liq. Arsen. et Hydrarg. Iod.	The equivalent of 1 per cent. w/v arsenic triiodide.
Arsenic Trioxide	
Liq. Arsenicalis	1 per cent. w/v arsenic trioxide.
Atropine Sulphate	
Lamell. Atrop.	1/5,000 grain (0·013 mg.) atropine sulphate in each.
Oculent. Atrop.	0·25 per cent. atropine sulphate.
Oculent. Atrop. c. Hyd.	
Oxid.	0·125 per cent. atropine sulphate.
Belladonna Herb	
	Not less than 0·3 per cent. alkaloids from European or Indian Belladonna, calculated as hyoscyamine.
Bellad. Pulverat.	0·3 per cent. alkaloids, calculated as hyoscyamine.
Ext. Bellad. Sicc.	1 per cent. alkaloids, calculated as hyoscyamine.
Tinct. Bellad.	0·03 per cent. w/v alkaloids, calculated as hyoscyamine.
Belladonna Root	
	Not less than 0·4 per cent. alkaloids from European or Indian Belladonna, calculated as hyoscyamine.
Emp. Bellad.	Approximately 0·25 per cent. alkaloids of belladonna root.
Ext. Bellad. Liq.	0·75 per cent. w/v alkaloids, calculated as hyoscyamine.
Lin. Bellad.	0·375 per cent. w/v alkaloids, calculated as hyoscyamine.
Suppos. Bellad.	2½ m. (0·15 ml.) liq. ext. bellad. in each suppository (=1/60 grain, 0·001 g., alkaloids).
Cantharidin	
Emp. Cantharidin.	Approximately 0·2 per cent. cantharidin.
Liq. Epispast.	0·4 per cent. w/v cantharidin.
Chloroxylenol	
Liq. Chloroxylenol.	5 per cent. w/v chloroxylenol.

Cocaine Hydrochloride

Lamell. Cocain. 1/50 grain (1·3 mg.) cocaine hydrochloride in each.

Oculent. Cocain. 0·25 per cent. cocaine hydrochloride.

Troch. Kramer. et Cocain. 1/20 grain (0·003 g.) cocaine hydrochloride in each.

Colchicum Corm

Not less than 0·25 per cent. colchicine in the dried corm.

Ext. Colch. Corm. Liq. 0·3 per cent. w/v colchicine.

Ext. Colch. Sicc. 1 per cent. colchicine.

Colchicum Seed

Not less than 0·3 per cent. colchicine.

Ext. Colch. Liq. 0·3 per cent. w/v colchicine.

Tinct. Colch. 0·03 per cent. w/v colchicine (from corm or seed).

Digitalis Leaf

Digit. Pulverat. 0·08 g. = 1 unit, biologically standardised.

Tinct. Digit. 1 ml. = 1 unit, biologically standardised (method 1).

Digitalis Powder

Inf. Digit. Rec. 1 ml. = 0·05 unit (a quantity equivalent to 1 g. of international standard powder to 250 ml. of water).

Tinct. Digit. A quantity equivalent to 8 g. of international standard powder to produce 100 ml. of tincture (method 2) or macerated in 100 ml. of alcohol, 70 per cent. (First Addendum method.)

Dithranol

Ung. Dithranol. 0·1 per cent. of dithranol.

Ergot

Not less than 0·2 per cent. alkaloids, calculated as ergotoxine, of which not less than 15 per cent. consists of water-soluble alkaloids, calculated as ergometrine.

Ergot. Præp. 0·2 per cent. alkaloids, calculated as ergotoxine, of which not less than 15 per cent. consists of water-soluble alkaloids calculated as ergometrine.

Ext. Ergot. Liq. When fresh, 0·06 per cent. w/v, after storage, not less than 0·04 per cent. w/v alkaloids, calculated as ergotoxine.

Glyceryl Trinitrate

Liq. Glyc. Trinit. 1 per cent. w/v of glyceryl trinitrate.

Tab. Glyc. Trinit. Each tablet contains 0·0005 g. (about 1/130 gr.) of glyceryl trinitrate.

Homatropine Hydrobromide

Lamell. Homatrop. 1/100 grain (0·65 mg.) homatropine hydrobromide in each.

Hyoscine Hydrobromide

Oculent. Hyoscinae 0·125 per cent. hyoscine hydrobromide.

Hyoscyamus	Not less than 0.05 per cent. alkaloids, calculated as hyoscyamine.
Ext. Hyoscy. Liq.	0.05 per cent. w/v alkaloids, calculated as hyoscyamine.
Ext. Hyoscy. Sicc.	0.3 per cent. w/v alkaloids, calculated as hyoscyamine.
Tinct. Hyoscy.	0.005 per cent. w/v alkaloids, calculated as hyoscyamine.
Pil. Colocynth. et Hyoscy.	12.5 per cent. of dry extract of hyoscyamus.
Iodine	
Liq. Iod. Aquos.	5 per cent. w/v iodine, 10 per cent. w/v potassium iodide.
Liq. Iod. Fort.	10 per cent. w/v iodine, 6 per cent. w/v potassium iodide.
Liq. Iod. Mit.	2.5 per cent. w/v iodine, 1.5 per cent. w/v potassium iodide.
Liq. Iod. Simp.	9 per cent. w/v (approximately 10 per cent. w/w) iodine.
Ol. Iodisat.	39 to 41 per cent. of combined iodine.
Syr. Ferr. Iod.	5 per cent. ferrous iodide.
Iodoform	
Oculent. Iodoform.	4 per cent. iodoform.
Suppos. Iodoform.	3 grains (0.2 g.) in each.
Ipecacuanha	Not less than 2 per cent. total alkaloids, calculated as emetine, of which not less than 55 per cent. consists of non-phenolic alkaloids, calculated as emetine.
Ext. Ipecac. Liq.	2 per cent. w/v alkaloids, calculated as emetine.
Ipecac. Pulverat.	2 per cent. total alkaloids, calculated as emetine, of which not less than 55 per cent. consists of non-phenolic alkaloids, calculated as emetine.
Pulv. Ipecac. et Opii	10 per cent. powdered ipecacuanha.
Tinct. Ipecac.	0.1 per cent. w/v alkaloids, calculated as emetine.
Troch. Morph. et Ipecac. ..	1/10 grain (0.006 g.) powdered ipecacuanha in each.
Lead Acetate	
Liq. Plumb. Subacet. Dil.	1.25 per cent. v/v strong solution = approximately 0.3 per cent. w/v lead subacetate.
Liq. Plumb. Subacet. Fort.	19 to 21.5 per cent. w/w of lead = approximately 25 per cent. w/v lead subacetate.
Suppos. Plumb. c. Opio ..	3 grains (0.2 g.) lead acetate in each.
Mercury	
Hydrarg. c. Creta.	33 per cent. mercury.
Inj. Hydrarg.	About 10 per cent. w/v mercury.
Pil. Hydrarg.	33 per cent. mercury.
Ung. Hydrarg.	30 per cent. mercury.

Ung. Hydrarg. Dil.	10 per cent. mercury.
Ung. Hydrarg. Comp.	12 per cent. mercury.
Ung. Hydrarg. Nit. Fort. ...	Not less than the equivalent of 6·7 per cent. mercury.
Ung. Hydrarg. Nit. Dil. ...	1/5th the strength of the strong ointment.
Mercury, Ammoniated	
Ung. Hydrarg. Ammon. ..	1 per cent. ammoniated mercury.
Mercuric Chloride	
Liq. Hydrarg. Perchlor. ...	0·1 per cent. w/v mercuric chloride.
Mercurous Chloride	
Inj. Hydrarg. Subchlor. ...	About 5 per cent. w/v mercurous chloride.
Lotio Hydrarg. Nigr.	The equivalent of 0·7 per cent. w/v mercurous chloride.
Ung. Hydrarg. Subchlor. ..	20 per cent. mercurous chloride.
Mercuric Iodide, Red	
Liq. Arsen. et Hydrarg. Iodid.	The equivalent of 1 per cent. w/v red mercuric iodide.
Mercury Oleate	
Hydrarg. Oleat.	The equivalent of 20 per cent. yellow mercuric oxide.
Ung. Hydrarg. Oleat.	25 per cent. oleated mercury.
Mercuric Oxide, Yellow	
Oculent. Hydrarg. Oxid. .	1 per cent. yellow mercuric oxide.
Morphine Hydrochloride	
Liq. Morph. Hydroch. ..	1 per cent. w/v morphine hydrochloride = 0·758 per cent. w/v anhydrous morphine.
Suppos. Morph.	$\frac{1}{2}$ grain (0·015 g.) morphine hydrochloride in each.
Troch. Morph. et Ipecac. ...	1/32 grain (0·002 g.) morphine hydrochloride in each.
Nux Vomica	Not less than 1·2 per cent. strychnine.
Ext. Nuc. Vom. Liq.	1·5 per cent. w/v strychnine.
Ext. Nuc. Vom. Sicc.	5 per cent. strychnine.
Nuc. Vom. Pulverat.	1·2 per cent. strychnine.
Tinct. Nuc. Vom.	0·125 per cent. w/v strychnine.
Opium	Moist as imported, not less than 9·5 per cent. morphine, calculated as anhydrous.
Ext. Opii Sicc.	20 per cent. morphine, calculated as anhydrous morphine.
Opium Pulverat.	10 per cent. morphine, calculated as anhydrous morphine.
Pulv. Cret. Aromat. c. Opio	2·5 per cent. powdered opium. = 0·25 per cent. anhydrous morphine.
Pulv. Ipecac. et Opii	10 per cent. powdered opium. = 1 per cent. anhydrous morphine.
Suppos. Plumbi c. Opio ..	1 grain (0·06 g.) powdered opium in each.
Tinct. Opii	1 per cent. w/v morphine, calculated as anhydrous morphine.

Tinct. Opii Camph.	0.05 per cent. w/v morphine, calculated as anhydrous morphine.
Tinct. Opii Camph. Conc.	0.4 per cent. w/v morphine, calculated as anhydrous morphine.
Phenol	
Glycer. Phenol.	16 per cent. phenol.
Phenol Liq.	80 per cent. phenol.
Suppos. Phenol.	1 grain (0.06 g.) phenol in each.
Troch. Phenol.	Approximately $\frac{1}{2}$ grain (0.03 g.) phenol in each.
Ung. Phenol.	3 per cent. phenol.
Physostigmine Salicylate	
Lamell. Physostig.	1/1,000 grain (0.065 mg.) physostigmine salicylate in each.
Oculent. Physostig.	0.125 per cent. physostigmine salicylate.
Potassium Hydroxide	
Liq. Pot. Hydrox.	5 per cent. w/v total alkali, calculated as potassium hydroxide.
Sodium Hydroxide	
Liq. Sod. Hydrox.	3.56 per cent. w/v total alkali, calculated as sodium hydroxide.
Squill	
Acetum Scillæ	Approximately 10 per cent. w/v squill.
Ext. Scillæ Liq.	Approximately 100 per cent. w/v squill.
Oxymel Scillæ	Approximately 5 per cent. w/v squill.
Syrup. Scillæ	Approximately 4.5 per cent. w/v squill.
Tinct. Scillæ	Approximately 10 per cent. w/v squill.
Stramonium	
Ext. Stramon. Liq.	Not less than 0.25 per cent. alkaloids, calculated as hyoscyamine.
Ext. Stramon. Sicc.	0.25 per cent. w/v alkaloids, calculated as hyoscyamine.
Tinct. Stramon.	1 per cent. alkaloids, calculated as hyoscyamine.
Strophanthus	
Tinct. Strophanth.	0.025 per cent. w/v alkaloids, calculated as hyoscyamine.
Strychnine Hydrochloride	
Liq. Strych. Hydroch.	Standardised by biological assay to be equal to the standard tincture of strophanthus = 0.42 per cent. w/v solution of the international standard ouabain, or 0.33 per cent. w/v solution of anhydrous ouabain.
Syr. Ferr. Phosph. c. Quin. et Strych.	0.03 per cent. w/v strychnine hydrochloride.
Syr. Ferr. Phosph. c. Strych.	0.03 per cent. w/v strychnine hydrochloride (= 0.0246 per cent. w/v strychnine).

DOSES OF OFFICIAL MEDICAMENTS

IMPERIAL AND METRIC

The following table shows the doses, in Imperial and Metric weights and measures, of chemicals, drugs and preparations in the British Pharmacopœia, 1932, and its Addenda.

Abbreviations used: gr.=grain; m.=minim; oz.=ounce; fl. oz.=fluid ounce; g.=gramme; mg.=milligram; ml.=millilitre.

The doses of most of the biologically tested preparations are given in units. The unit dose of these preparations is based on a particular therapeutic function of the drug concerned, which differs for each; for example, the unit of Insulin is a measure of the power of the drug to reduce the concentration of the blood sugar, that of Digitalis is a measure of its effect on heart function, whilst that of Diphtheria Antitoxin is a measure of its antitoxic power against diphtheria toxin. It follows that, as these units are not definite weights or volumes, they apply only to the particular kind of drug or preparation to which they refer, and in different kinds of drugs have no relation one to another. The Pharmacopœia should be consulted for detailed information regarding the standardisation and doses of these special preparations.

Name	Metric	Imperial
Acetarsol	0.06 to 0.25 g.	1 to 4 gr.
Acetomenaphthone	0.01 to 0.06 g.	$\frac{1}{8}$ to 1 gr.
Acetum Scillæ	0.6 to 2 ml.	10 to 30 m.
Acidum Aceticum Dilutum	2 to 4 ml.	30 to 60 m.
Acidum Acetylsalicylicum	0.3 to 1 g.	5 to 15 gr.
	0.025 to 0.05 g.	$\frac{2}{5}$ to $\frac{4}{5}$ gr.
	500 to 1000 units	
Acidum Ascorbicum	(prophylactic daily doses)	
	0.1 to 0.25 g.	$1\frac{1}{2}$ to 4 gr.
	2000 to 5000 units	
	(therapeutic daily doses)	
Acidum Benzoicum	0.3 to 1 g.	5 to 15 gr.
Acidum Boricum	0.3 to 1 g.	5 to 15 gr.
Acidum Citricum	0.3 to 2 g.	5 to 30 gr.
Acidum Hydrobromicum Dilutum	1 to 4 ml.	15 to 60 m.
Acidum Hydrochloricum Dilutum	0.3 to 4 ml.	5 to 60 m.
Acidum Hydrocyanicum Dilutum	0.12 to 0.3 ml.	2 to 5 m.
Acidum Hypophosphorosum Dilutum	0.3 to 1 ml.	5 to 15 m.
Acidum Lacticum	0.3 to 1.2 ml.	5 to 20 m.
Acidum Mandelicum	2 to 4 g.	30 to 60 gr.
Acidum Nicotinicum	0.05 to 0.1 g.	$\frac{1}{4}$ to $1\frac{1}{2}$ gr.
Acidum Oleicum	0.3 to 1 ml.	5 to 15 m.
Acidum Phosphoricum Dilutum	0.3 to 4 ml.	5 to 60 m.
Acidum Salicylicum	0.3 to 0.6 g.	5 to 10 gr.
Acidum Sulphuricum Dilutum	0.3 to 4 ml.	5 to 60 m.
Acidum Tannicum	0.3 to 0.6 g.	5 to 10 gr.
Acidum Tartaricum	0.3 to 2 g.	5 to 30 gr.
Acriflavina	0.03 to 0.1 g.	$\frac{1}{2}$ to $1\frac{1}{2}$ gr.
Adrenalina	0.0001 to 0.0005 g.	$\frac{1}{600}$ to $\frac{1}{120}$ gr.
	by injection	
Æther	1 to 4 ml.	15 to 60 m.
Agar	4 to 16 g.	60 to 240 gr.

Name	Metric	Imperial
Alcohol Tribromoethylicum	0.075 to 0.1 g. per kg. body weight by rectal injection	$\frac{1}{2}$ to $\frac{2}{3}$ gr. per lb. body weight
Aloe	0.12 to 0.3 g.	2 to 5 gr.
Aloinum	0.015 to 0.06 g.	$\frac{1}{4}$ to 1 gr.
Alumen	0.3 to 0.6 g.	5 to 10 gr.
Amidopyrina	0.3 to 0.6 g.	5 to 10 gr.
Ammonii Bicarbonas	0.3 to 0.6 g.	5 to 10 gr.
Ammonii Carbonas	0.3 to 0.6 g.	5 to 10 gr.
Ammonii Chloridum	0.3 to 4 g.	5 to 60 gr.
Amyleni Hydras	2 to 4 ml.	30 to 60 m.
Amylis Nitris	0.12 to 0.3 ml. by inhalation	2 to 5 m.
Amylocainæ Hydrochloridum	0.02 to 0.05 g. by the mouth and by subcutaneous injection	$\frac{1}{8}$ to $\frac{3}{4}$ gr.
	0.02 to 0.1 g. by intrathecal injection	$\frac{1}{8}$ to $\frac{1}{2}$ gr.
	0.0003 to 0.0006 g. 100 to 200 units (prophylactic)	$\frac{1}{200}$ to $\frac{1}{100}$ gr.
Aneurinæ Hydrochloridum	0.0006 to 0.0018 g. 200 to 600 units (therapeutic)	$\frac{1}{100}$ to $\frac{1}{50}$ gr.
Antimonii et Potassii Tartras	0.002 to 0.008 g. 0.03 to 0.06 g. (emetic doses)	$\frac{1}{32}$ to $\frac{1}{8}$ gr. $\frac{1}{2}$ to 1 gr.
	0.03 to 0.12 g. by intravenous injection	$\frac{1}{2}$ to 2 gr.
Antimonii et Sodii Tartras	0.002 to 0.008 g. 0.03 to 0.06 g. (emetic doses)	$\frac{1}{32}$ to $\frac{1}{8}$ gr. $\frac{1}{2}$ to 1 gr.
	0.03 to 0.12 g. by intravenous injection	$\frac{1}{2}$ to 2 gr.
Antitoxinum Diphthericum	500 to 1000 units (prophylactic)	by injection
	10,000 to 20,000 units (therapeutic)	
Antitoxinum Œdematiens	20,000 units (prophylactic)	by injection
	50,000 to 100,000 units (therapeutic)	
Antitoxinum Staphylococcicum	5000 to 20,000 units (prophylactic)	by injection
	1000 to 2000 units (therapeutic)	
Antitoxinum Tetanicum	20,000 to 40,000 units (therapeutic)	by injection
	5000 units (prophylactic)	
Antitoxinum Vibriosepticum	10,000 to 20,000 units (therapeutic)	by injection
	4000 units (prophylactic)	
Antitoxinum Welchicum	10,000 to 20,000 units (therapeutic)	by injection
	0.001 to 0.002 g. (expectorant doses)	$\frac{1}{64}$ to $\frac{1}{32}$ gr.
Apomorphinæ Hydrochloridum	0.002 to 0.008 g. (hypnotic and emetic doses by subcutaneous injection)	$\frac{1}{32}$ to $\frac{1}{8}$ gr.
Aqua Anethi Concentrata	0.3 to 1 ml.	5 to 15 m.
Aqua Anethi Destillata	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Aqua Camphoræ	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Aqua Chloroformi	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Aqua Cinnamomi Concentrata	0.3 to 1 ml.	5 to 15 m.
Aqua Cinnamomi Destillata	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Aqua Menthae Piperitæ Concentrata	0.3 to 1 ml.	5 to 15 m.
Aqua Menthae Piperitæ Destillata	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.

Name	Metric	Imperial
Argenti Nitras.....	0.008 to 0.016 g.	1/8 to 1/4 gr.
Arseni Triflodidum.....	0.004 to 0.016 g.	1/16 to 1/4 gr.
Arseni Trioxidum.....	0.001 to 0.005 g.	1/60 to 1/12 gr.
Asafoetida.....	0.3 to 1 g.	5 to 15 gr.
Atropina.....	0.00025 to 0.001 g.	1/240 to 1/60 gr.
Atropina Sulphas.....	0.00025 to 0.001 g.	1/240 to 1/60 gr.
Balsamum Peruvianum.....	0.3 to 1 ml.	5 to 15 m.
Balsamum Tolutanum.....	0.3 to 1 g.	5 to 15 gr.
Barbitonum.....	0.3 to 0.6 g.	5 to 10 gr.
Barbitonum Solubile.....	0.3 to 0.6 g.	5 to 10 gr.
Belladonna Pulverata.....	0.03 to 0.2 g.	1/2 to 3 gr.
Belladonna Radix.....	0.03 to 0.12 g.	1/2 to 2 gr.
Benzocaina.....	0.3 to 0.6 g.	5 to 10 gr.
Benzoinum.....	0.6 to 2 g.	10 to 30 gr.
Benzylis Benzoas.....	0.3 to 0.5 ml.	5 to 8 m.
Betanaphthol.....	0.3 to 0.6 g.	5 to 10 gr.
Bismuthi Carbonas.....	0.6 to 2 g.	10 to 30 gr.
Bismuthi et Sodii Tartras.....	0.6 to 0.2 g. by intramuscular injection	1 to 3 gr.
Bismuthi Oxychloridum.....	0.6 to 2 g. 0.1 to 0.2 g. by intramuscular injection	10 to 30 gr. 1 1/2 to 3 gr.
Bismuthi Salicylas.....	0.6 to 2 g. 0.06 to 0.12 g. by intramuscular injection	10 to 30 gr. 1 to 2 gr.
Bismuthi Subgallas.....	0.6 to 2 g. 0.1 to 0.2 g. by intramuscular injection	10 to 30 gr. 1 1/2 to 3 gr.
Bismuthum Præcipitatum.....	0.3 to 1 g. 0.075 to 0.1 ml. per kg. body weight	5 to 15 gr. 1/2 to 3/4 m. per lb. body weight
Borax.....	0.075 to 0.1 ml. by rectal injection	15 to 30 gr.
Bromethol.....	1 to 2 g. 0.12 to 0.3 g. 0.3 to 1 g. 0.12 to 0.3 g. by injection	2 to 5 gr. 5 to 15 gr. 2 to 5 gr.
Buchu.....	0.025 to 0.05 mg. 1000 to 2000 units (prophylactic daily doses for an infant)	1/2400 to 1/1200 gr.
Caffeina.....	0.05 to 0.075 mg. 2000 to 3000 units (therapeutic daily doses for an infant)	1/1200 to 1/800 gr.
Caffeina et Sodii Benzoas.....	1 to 4 g. 0.6 to 2 g. 0.06 to 0.2 g. by intramuscular injection	15 to 60 gr. 10 to 30 gr. 1 to 3 gr.
Calciferol.....	0.6 to 2 g. by intravenous injection	10 to 30 gr.
Calcii Carbonas.....	2 to 4 g. 0.3 to 1 g. 1 to 4 g. 0.6 to 2 g. 0.6 to 2 g.	30 to 60 gr. 5 to 15 gr. 15 to 60 gr. 10 to 30 gr. 10 to 30 gr.
Calcii Chloridum.....	0.12 to 0.3 g. 0.06 to 0.2 g. by subcutaneous injection	2 to 5 gr. 1 to 3 gr.
Calcii Chloridum Hydratum.....	0.03 to 0.12 g. 0.001 to 0.004 g. 0.00025 to 0.0005 g. by subcutaneous injection	1/2 to 2 gr. 1/64 to 1/16 gr. 1/240 to 1/120 gr.
Calcii Gluconas.....	2 to 4 ml. 0.3 to 1 g. 0.6 to 2 g. 0.6 to 2 g.	30 to 60 m. 5 to 15 gr. 10 to 30 gr. 10 to 30 gr.
Calcii Hydroxidum.....	0.12 to 0.3 g.	2 to 5 gr.
Calcii Lactas.....	0.6 to 2 g.	10 to 30 gr.
Calcii Phosphas.....	0.6 to 2 g.	10 to 30 gr.
Calumba.....	0.6 to 2 g.	10 to 30 gr.
Camphora.....	0.12 to 0.3 g. 0.06 to 0.2 g. by subcutaneous injection	2 to 5 gr. 1 to 3 gr.
Capsicum.....	0.03 to 0.12 g.	1/2 to 2 gr.
Carbacholum.....	0.001 to 0.004 g. 0.00025 to 0.0005 g. by subcutaneous injection	1/64 to 1/16 gr. 1/240 to 1/120 gr.
Carbonei Tetrachloridum.....	2 to 4 ml.	30 to 60 m.
Carbromalum.....	0.3 to 1 g.	5 to 15 gr.
Cardamomum.....	0.6 to 2 g.	10 to 30 gr.
Carum.....	0.6 to 2 g.	10 to 30 gr.
Caryophyllum.....	0.12 to 0.3 g.	2 to 5 gr.
Cascara Sagrada.....	1.2 to 4 g.	20 to 60 gr.
Cassia.....	4 to 8 g.	60 to 120 gr.

Name	Metric	Imperial
Catechu	0.3 to 1 g.	5 to 15 gr.
Chiniofonum	0.06 to 0.5 g. 1 to 5 g.	1 to 8 gr. 15 to 75 gr.
Chloralis Hydras	0.3 to 1.2 g.	5 to 20 gr.
Chlorbutol	0.3 to 1.2 g.	5 to 20 gr.
Chloroformum	0.06 to 0.3 ml.	1 to 5 m.
Cinchona	0.3 to 1 g.	5 to 15 gr.
Cinchophenum	0.3 to 0.6 g.	5 to 10 gr.
Cinnamomum	0.3 to 1.2 g.	5 to 20 gr.
Cocaine	0.008 to 0.016 g.	1/8 to 1/4 gr.
Cocaine Hydrochloridum	0.008 to 0.016 g.	1/8 to 1/4 gr.
Codaina	0.016 to 0.06 g.	1/4 to 1 gr.
Codinae Phosphas	0.016 to 0.06 g.	1/4 to 1 gr.
Colchici Cormus	0.12 to 0.3 g.	2 to 5 gr.
Colchici Semen	0.12 to 0.3 g.	2 to 5 gr.
Colocynthis	0.12 to 0.3 g.	2 to 5 gr.
Confectio Sennae	4 to 8 g.	60 to 120 gr.
Confectio Sulphuris	4 to 8 g.	60 to 120 gr.
Copaiba	0.6 to 2 ml.	10 to 30 m.
Coriandrum	0.3 to 1 g.	5 to 15 gr.
Croosotum	0.12 to 0.6 ml.	2 to 10 m.
Cresol	0.06 to 0.2 ml.	1 to 3 m.
Creta	1 to 4 g.	15 to 60 gr.
Cupri Sulphas	0.016 to 0.12 g. 0.3 to 0.6 g.	1/4 to 2 gr. 5 to 10 gr.
	(emetic doses)	
Diamorphinae Hydrochloridum	0.0025 to 0.008 g.	1/32 to 1/8 gr.
Digitalis Pulverata	0.03 to 0.1 g. 0.2 to 0.6 g.	1/2 to 1 1/2 gr. 3 to 10 gr.
	(single doses)	
Digoxinum	0.001 to 0.0015 g. 0.00025 g.	1/50 to 1/40 gr. (initial doses)
	(twice daily—maintenance doses)	
	0.0005 to 0.001 g.	1/200 to 1/100 gr.
	(by intravenous injection)	
Elixir Cascarae Sagradae	2 to 4 ml.	30 to 50 m.
Emetine et Bismuthi Iodidum	0.06 to 0.2 g.	1 to 3 gr.
Emetine Hydrochloridum	0.03 to 0.06 g.	1/2 to 1 gr.
	(by injection)	
Emulsio Chloroformi	0.3 to 2 ml.	5 to 30 m.
Emulsio Menthae Piperitae	0.3 to 2 ml.	5 to 30 m.
	2 to 4 ml.	30 to 60 m.
	Vitamin A 1000 to 2000 units	
	Vitamin D 100 to 200 units	
	(prophylactic)	
Emulsio Olei Morrhuae	6 to 12 ml.	90 to 180 m.
	Vitamin A 3000 to 6000 units	
	Vitamin D 300 to 600 units	
	(therapeutic)	
	2 to 4 ml.	30 to 60 m.
	Vitamin A 1000 to 2000 units	
	Vitamin D 100 to 200 units	
	(prophylactic)	
Emulsio Olei Vitaminati	6 to 12 ml.	90 to 180 m.
	Vitamin A 3000 to 6000 units	
	Vitamin D 300 to 600 units	
	(therapeutic)	
Ephedrina	0.016 to 0.1 g.	1/4 to 1 1/2 gr.
Ephedrinae Hydrochloridum	0.016 to 0.1 g.	1/4 to 1 1/2 gr.
	0.0005 to 0.001 g.	1/200 to 1/100 gr.
	0.00025 to 0.0005 g.	1/240 to 1/120 gr.
Ergometrina	by intramuscular injection	
	0.000125 to 0.00025 g.	1/480 to 1/240 gr.
	by intravenous injection	

Name	Metric	Imperial
Ergota Preparata.....	0.15 to 0.5 g.	2 1/2 to 8 gr.
Ergotoxinæ Æthanosulphonas.....	0.0005 to 0.001 g. by subcutaneous or intramuscular injection	1/120 to 1/60 gr. 1/2 to 2 gr.
Erythritylis Tetranitras Dilutus.....	0.03 to 0.12 g. representing 0.015 to 0.06 g. of pure Erythrityl Tetranitrate	1/4 to 1 gr. 1/2 to 2 gr. of pure Erythrityl Tetranitrate
Eucalyptol.....	0.06 to 0.2 ml.	1 to 3 m.
Extractum Belladonnæ Liquidum.....	0.015 to 0.06 ml.	1/4 to 1 m.
Extractum Belladonnæ Siccum.....	0.015 to 0.06 g.	1/4 to 1 gr.
Extractum Cascaræ Sagradæ Liquidum.....	2 to 4 ml.	30 to 60 m.
Extractum Cascaræ Sagradæ Siccum.....	0.12 to 0.5 g.	2 to 8 gr.
Extractum Cinchonæ.....	0.12 to 0.5 g.	2 to 8 gr.
Extractum Cinchonæ Liquidum.....	0.3 to 1 ml.	5 to 15 m.
Extractum Colchici Cormi Liquidum.....	0.12 to 0.3 ml.	2 to 5 m.
Extractum Colchici Siccum.....	-0.12 to 0.3 ml.	2 to 5 m.
Extractum Colocyntidis Compositum.....	0.015 to 0.06 g.	1/4 to 1 gr.
Extractum Ergotæ Liquidum.....	0.12 to 0.5 g.	2 to 8 gr.
Extractum Ergotæ Bovini.....	0.6 to 1.2 ml.	10 to 20 m.
Extractum Filicis.....	0.3 to 1 g.	5 to 15 gr.
Extractum Gentianæ.....	3 to 6 ml.	45 to 90 m.
Extractum Glycyrrhizæ.....	0.12 to 0.5 g.	2 to 8 gr.
Extractum Glycyrrhizæ Liquidum.....	0.6 to 2 g.	10 to 30 gr.
Extractum Hamamelidis Liquidum.....	2 to 4 ml.	30 to 60 m.
Extractum Hepatis Liquidum.....	2 to 4 ml.	30 to 60 m.
Extractum Hepatis Siccum.....	30 ml.	1 fl. oz.
Extractum Hyoscyami Liquidum.....	The quantity equivalent to 225 g., or about half-a-pound of fresh liver.	
Extractum Hyoscyami Siccum.....	0.2 to 0.4 ml.	3 to 6 m.
Extractum Ipecacuanhæ Liquidum.....	0.016 to 0.06 g. 0.03 to 0.12 ml. 0.6 to 2 ml.	1/4 to 1 gr. 1/2 to 2 m. 10 to 30 m.
Extractum Kramerizæ Siccum.....		(emetic doses)
Extractum Malti.....	0.3 to 1 g.	5 to 15 gr.
Extractum Malti cum Oleo Morrhuæ.....	4 to 16 ml.	60 to 240 m.
Extractum Malti cum Oleo Vitaminato.....	4 to 16 ml.	60 to 240 m.
Extractum Nucis Vomizæ Liquidum.....	Vitamin A 650 to 2500 units Vitamin D 65 to 250 units	
Extractum Nucis Vomizæ Siccum.....	0.06 to 0.2 ml.	1 to 3 m.
Extractum Opii Siccum.....	0.015 to 0.06 g.	1/4 to 1 gr.
Extractum Pituitarii Liquidum.....	0.015 to 0.06 g. 2 to 5 units (0.2 to 0.5 ml.)	1/4 to 1 gr.
Extractum Quillaisæ Liquidum.....	by subcutaneous injection	
Extractum Scillæ Liquidum.....	0.1 to 0.2 ml.	1/2 to 3 m.
Extractum Senegæ Liquidum.....	0.03 to 0.2 ml.	1/2 to 3 m.
Extractum Sennæ Liquidum.....	0.3 to 1 ml.	5 to 15 m.
Extractum Stramonii Liquidum.....	0.6 to 2 ml.	10 to 30 m.
Extractum Stramonii Siccum.....	0.03 to 0.2 ml. 0.015 to 0.06 g. 0.06 to 0.5 g.	1/2 to 3 m. 1/4 to 1 gr. 1 to 8 gr.
Ferri Carbonas Saccharatus.....	in post-encephalitic and similar conditions	
Ferri et Ammonii Citras.....	0.6 to 2 g.	10 to 30 gr.
Ferri et Quininzæ Citras.....	1.3 to 2.6 g.	20 to 40 gr.
Ferri Subchloridum Citratum.....	0.3 to 1 g.	5 to 15 gr.
Ferri Sulphas.....	0.2 to 0.3 g.	3 to 5 gr.
Ferri Sulphas Exsiccatus.....	0.06 to 0.3 g.	1 to 5 gr.
Ferrum Redactum.....	0.03 to 0.2 g.	1/2 to 3 gr.
Filix Mas.....	0.06 to 0.6 g.	1 to 10 gr.
Foeniculum.....	4 to 12 g.	60 to 180 gr.
Gentiana.....	0.3 to 0.6 g.	5 to 10 gr.
Glycerinum.....	0.6 to 2 g.	10 to 30 gr.
Glycerinum Acidi Borici.....	4 to 8 ml.	60 to 120 m.
Glycerinum Acidi Tannici.....	2 to 8 ml.	30 to 120 m.
	by rectal injection	
	0.6 to 2 ml.	10 to 30 m.
	0.6 to 2 ml.	10 to 30 m.

Name	Metric	Imperial
Glycerinum Aluminis.....	2 to 4 ml.	30 to 60 m.
Glycerinum Boracis.....	2 to 4 ml.	30 to 60 m.
Glycerinum Phenolis.....	0.3 to 1 ml.	5 to 15 m.
Glycyrrhiza.....	1 to 4 g.	15 to 60 gr.
Guaiacol.....	0.3 to 0.6 ml.	5 to 10 m.
Hexamina.....	0.6 to 2 g.	10 to 30 gr.
Hexobarbitonum.....	0.25 to 0.5 g.	4 to 8 gr.
	0.2 to 1 g.	3 to 15 gr.
Hexobarbitonum Solubile.....	by intravenous or intramuscular injection	30 to 60 gr.
	2 to 4 g.	30 to 60 gr.
	by rectal injection	
Histaminæ Phosphas Acidus.....	0.0005 to 0.001 g.	$\frac{1}{120}$ to $\frac{1}{60}$ gr.
	by subcutaneous injection	
Homatropinæ Hydrobromidum.....	0.001 to 0.002 g.	$\frac{1}{64}$ to $\frac{1}{32}$ gr.
Hydrargyri Iodidum Rubrum.....	0.002 to 0.004 g.	$\frac{1}{32}$ to $\frac{1}{16}$ gr.
	0.005 to 0.01 g.	$\frac{1}{16}$ to $\frac{1}{8}$ gr.
	by intramuscular injection	
Hydrargyri Oxycyanidum.....	0.01 g.	$\frac{1}{8}$ gr.
	by intravenous injection	
Hydrargyri Perchloridum.....	0.002 to 0.004 g.	$\frac{1}{32}$ to $\frac{1}{16}$ gr.
	0.03 to 0.2 g.	$\frac{1}{2}$ to 3 gr.
Hydrargyri Subchloridum.....	0.03 to 0.06 g.	$\frac{1}{8}$ to 1 gr.
	by intramuscular injection	
	0.03 to 0.2 g.	$\frac{1}{2}$ to 3 gr.
Hydrargyrum.....	0.03 to 0.06 g.	$\frac{1}{2}$ to 1 gr.
	by intramuscular injection	
Hydrargyrum cum Creta.....	0.06 to 0.3 g.	1 to 5 gr.
Hyoscine Hydrobromidum.....	0.0003 to 0.0006 g.	$\frac{1}{200}$ to $\frac{1}{100}$ gr.
Hyoscyamus.....	0.2 to 0.4 g.	3 to 6 gr.
Ichthammol.....	0.3 to 0.6 g.	5 to 10 gr.
	0.05 to 0.1 g.	$\frac{3}{4}$ to $1\frac{1}{2}$ gr.
	by subcutaneous or intramuscular injection	
Indicarminum.....	0.008 to 0.016 g.	$\frac{1}{8}$ to $\frac{1}{4}$ gr.
	by intravenous injection	
Infusum Aurantii Concentratum.....	2 to 4 ml.	30 to 60 m.
Infusum Aurantii Recens.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Infusum Buchu Concentratum.....	4 to 8 ml.	60 to 120 m.
Infusum Buchu Recens.....	30 to 60 ml.	1 to 2 fl. oz.
Infusum Calumbæ Concentratum.....	2 to 4 ml.	30 to 60 m.
Infusum Calumbæ Recens.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Infusum Caryophylli Concentratum.....	2 to 4 ml.	30 to 60 m.
Infusum Caryophylli Recens.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Infusum Digitalis Recens.....	6 to 20 ml.	90 to 300 m.
	30 to 120 ml.	1 to 4 fl. oz.
	(single doses)	
Infusum Gentianæ Compositum Concentratum.....	2 to 4 ml.	30 to 60 m.
Infusum Gentianæ Compositum Recens.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Infusum Quassie Concentratum.....	2 to 4 ml.	30 to 60 m.
Infusum Quassie Recens.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Infusum Senegæ Concentratum.....	2 to 4 ml.	30 to 60 m.
Infusum Senegæ Recens.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Infusum Sennæ Concentratum.....	2 to 8 ml.	30 to 120 m.
Infusum Sennæ Recens.....	15 to 60 ml.	$\frac{1}{2}$ to 2 fl. oz.
Injectio Bismuthi.....	0.5 to 1 ml.	8 to 15 m.
	by intramuscular injection	
Injectio Bismuthi Oxichloridi.....	1 to 2 ml.	15 to 30 m.
	by intramuscular injection	
Injectio Bismuthi Salicylatis.....	0.6 to 1.2 ml.	10 to 20 m.
	by intramuscular injection	
Injectio Calcii Gluconatis.....	10 to 20 ml.	150 to 300 m.
Injectio Ferri.....	1 to 2 ml.	15 to 30 m.
	by intramuscular injection	
Injectio Hydrargyri.....	0.3 to 0.6 ml.	5 to 10 m.
	by intramuscular injection	
Injectio Hydrargyri Subchloridi.....	0.6 to 1.2 ml.	10 to 20 m.
	by intramuscular injection	

Name	Metric	Imperial
Injectio Leptazoli	0.5 to 1 ml. by subcutaneous injection 2 to 5 ml. increasing to 12 ml.	8 to 15 m. 30 to 75 m. increasing to 180 m.
Injectio Mersalyli	by intravenous injection as a convulsant 0.5 to 2 ml.	8 to 30 m.
Injectio Nikethamidi	by injection 1 to 4 ml.	15 to 60 m.
Injectio Procainæ et Adrenalinæ Mitis	by subcutaneous or intramuscular injection 5 to 16 ml.	75 to 240 m.
Injectio Procainæ et Adrenalinæ Mitis	by intravenous injection as a convulsant Up to 300 ml.	Up to 10 1/2 fl. oz.
Injectio Quininæ et Urethani	0.5 to 5 ml. by intravenous injection as a sclerosing agent	8 to 75 m.
Injectio Sodii Morrhuatæ	0.5 to 5 ml. by intravenous injection as a sclerosing agent	8 to 75 m.
Insulinum	5 to 100 units by subcutaneous injection	
Iodoformum	0.03 to 0.2 g. 0.04 to 0.06 g.	1/2 to 3 gr. 1/2 to 1 1/2 gr.
Iodophthaleinum	per kg. of body weight up to 5 g.	per lb. of body weight up to 75 gr.
Iodoxylinum	Up to 3 g. by intravenous injection 10 to 15 g.	Up to 45 gr. 150 to 225 gr.
Ipecacuanha Pulverata	by intravenous injection 0.03 to 0.12 g. 1 to 2 g.	1/2 to 2 gr. 15 to 30 gr.
Ipomœa	(emetic doses) 0.3 to 1.2 g.	5 to 20 gr.
Jalapa Pulverata	0.3 to 1.2 g.	5 to 20 gr.
Kaolinum Leve	15 to 60 g.	1/2 to 2 oz.
Krameria	0.6 to 2 g.	10 to 30 gr.
Leptazolium	0.05 to 0.1 g. 0.12 to 0.5 ml.	3/4 to 1 1/2 gr. 2 to 8 m.
Liquor Adrenalinæ Hydrochloridi	by subcutaneous injection 0.125 to 0.5 ml.	2 to 8 m.
Liquor Æthylis Nitritus Concentratus	1 to 4 ml.	15 to 60 m.
Liquor Ammonis Aromaticus	0.6 to 1.2 ml.	10 to 20 m.
Liquor Ammonis Dilutus	8 to 30 ml.	1/4 to 1 fl. oz.
Liquor Ammonii Acetatis Dilutus	1 to 4 ml.	15 to 60 m.
Liquor Ammonii Acetatis Fortis	0.12 to 0.5 ml.	2 to 8 m.
Liquor Arsenicalis	0.3 to 1 ml.	5 to 15 m.
Liquor Arseni et Hydrargyri Iodidi	0.3 to 0.6 ml.	5 to 10 m.
Liquor Calciferolis	1000 to 2000 units (prophylactic daily doses for an infant) 0.6 to 1 ml.	10 to 15 m.
Liquor Calcii Hydroxidi	2000 to 3000 units (therapeutic daily doses for an infant) 30 to 120 ml.	1 to 4 fl. oz.
Liquor Ferri Perchloridi	0.3 to 1 ml.	5 to 15 m.
Liquor Glycerilis Trinitratæ	0.03 to 0.12 ml.	1/2 to 2 m.
Liquor Hydrargyri Perchloridi	2 to 4 ml.	30 to 60 m.
Liquor Hydrogenii Peroxidi	2 to 8 ml.	30 to 120 m.
Liquor Iodi Aquosus	0.3 to 1 ml.	5 to 15 m.
Liquor Iodi Mitis	0.3 to 1 ml.	5 to 30 m.
Liquor Iodi Simplex	0.2 to 1 ml.	3 to 15 m.
Liquor Magnesii Bicarbonatis	30 to 60 ml.	1 to 2 fl. oz.
Liquor Morphine Hydrochloridi	0.3 to 2 ml.	5 to 30 m.
Liquor Quininæ Ammoniatæ	2 to 4 ml.	30 to 60 m.
Liquor Strychninæ Hydrochloridi	0.2 to 0.8 ml.	3 to 12 m.
Liquor Vitamini A Concentratus	0.06 to 0.3 ml.	1 to 5 m.
	2500 to 12,500 units	

Name	Metric	Imperial
Liquor Vitamini D Concentratus.....	0.03 to 0.2 ml. 250 to 1500 units	$\frac{1}{2}$ to 3 m. units
Liquor Vitaminorum A et D Concentratus.....	0.06 to 0.3 ml. Vitamin A 2500 to 15,500 units Vitamin D 250 to 1250 units	to 5 m. to 500 units to 1250 units
Lobelia.....	0.06 to 0.2 g.	1 to 3 gr.
Magnesi Carbonas Levis.....	0.6 to 4 g.	10 to 60 gr.
Magnesi Carbonas Ponderosus.....	0.6 to 4 g.	10 to 60 gr.
Magnesi Oxidum Leve.....	0.6 to 4 g.	10 to 60 gr.
Magnesi Oxidum Ponderosum.....	0.6 to 4 g.	10 to 60 gr.
Magnesi Sulphas.....	2 to 16 g.	30 to 240 gr.
Magnesi Trisilicas.....	0.3 to 2 g.	5 to 30 gr.
Menaphthone.....	0.005 to 0.01 g.	$\frac{1}{2}$ to $\frac{1}{2}$ gr.
Menthol.....	0.03 to 0.12 g.	$\frac{1}{2}$ to 2 gr.
Mepacrinæ Hydrochloridum.....	0.05 to 0.1 g.	$\frac{1}{4}$ to $\frac{1}{2}$ gr.
Mepacrinæ Methanosulphonas.....	0.05 to 0.1 g. by intramuscular injection	$\frac{1}{4}$ to $\frac{1}{2}$ gr. injection
Methylis Salicylas.....	0.3 to 1 ml.	5 to 15 m.
Methylsulphonas.....	0.3 to 1.2 g.	5 to 20 gr.
Methylthionias Chloridum.....	0.06 to 0.3 g.	1 to 5 gr.
Mistura Magnesi Hydroxidi.....	4 to 16 ml.	60 to 240 m.
Mistura Sennæ Composita.....	30 to 60 ml.	1 to 2 fl. oz.
Morphinæ Hydrochloridum.....	0.008 to 0.02 g.	$\frac{1}{8}$ to $\frac{1}{8}$ gr.
Morphinæ Sulphas.....	0.008 to 0.02 g.	$\frac{1}{8}$ to $\frac{1}{8}$ gr.
Morphinæ Tartras.....	0.008 to 0.02 g.	$\frac{1}{8}$ to $\frac{1}{8}$ gr.
Mucilago Acaciæ.....	4 to 16 ml.	60 to 240 m.
Mucilago Tragacanthæ.....	4 to 16 ml.	60 to 240 m.
Myristica.....	0.3 to 0.6 g.	5 to 10 gr.
Myrrha.....	0.3 to 1 g.	5 to 15 gr.
Neosaprenamina.....	0.15 to 0.9 g. by intravenous injection	$\frac{21}{2}$ to 14 gr. injection
Nicotinamidum.....	0.02 to 0.1 g.	$\frac{1}{8}$ to $\frac{1}{2}$ gr.
Nikethamidum.....	0.2 to 0.5 g. 0.5 to 1.25 g. by intravenous injection as a stimulant	3 to 8 gr. 8 to 20 gr. injection
Nux Vomica Pulverata.....	0.06 to 0.25 g.	1 to 4 gr.
Oleum Amygdalæ.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Oleum Amygdalæ Volatile Purificatum.....	0.016 to 0.06 ml.	$\frac{1}{2}$ to 1 m.
Oleum Anethi.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Anisi.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Arachidis.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Oleum Cajuputi.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Cari.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Caryophylli.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Chenopodii.....	0.2 to 1 ml.	3 to 15 m.
Oleum Cinnamomi.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Coriandri.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Eucalypti.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Gossypii Seminis.....	15 to 30 ml.	$\frac{1}{2}$ to 1 fl. oz.
Oleum Hippoglossi.....	0.06 to 0.3 ml. 1500 to 7500 units	1 to 5 m. units
	0.3 to 1 ml., increasing gradually	5 to 15 m. increasing gradually
Oleum Hydnocarpi.....	to 4 ml. 2 ml. increasing gradually to 5 ml. by subcutaneous and intramuscular injection	to 60 m. 30 m. increasing gradually to 75 m. injection
	0.3 to 1 ml., increasing gradually to 4 ml. 2 ml. increasing gradually to 5 ml. by subcutaneous and intramuscular injection	5 to 15 m., increasing gradually to 60 m. 30 m. increasing gradually to 75 m. injection
Oleum Hydnocarpi Æthylicum.....		

Name	Metric	Imperial
Oleum Lavandulæ.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Limonis.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Lini.....	15 to 30 ml.	1/2 to 1 fl. oz.
Oleum Menthae Piperitæ.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Morrhuæ	1 to 2 ml.	15 to 30 m.
	(prophylactic doses, three times daily)	
Oleum Myristicæ.....	3 to 6 ml.	45 to 90 m.
	(therapeutic doses, three times daily)	
Oleum Olivæ.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Ricini.....	15 to 30 ml.	1/2 to 1 fl. oz.
Oleum Rosmarini.....	4 to 16 ml.	60 to 240 m.
Oleum Santali.....	0.06 to 0.2 ml.	1 to 3 m.
Oleum Santali Australiensis.....	0.3 to 1 ml.	5 to 15 m.
Oleum Sesami.....	0.3 to 1 ml.	5 to 15 m.
Oleum Terebinthinæ.....	15 to 30 ml.	1/2 to 1 fl. oz.
	0.2 to 0.6 ml.	3 to 10 m.
Oleum Terebinthinæ.....	8 to 16 ml.	120 to 240 m.
	(anthelmintic doses)	
Oleum Vitaminatum	1 to 2 ml.	15 to 30 m.
	Vitamin A 1000 to 2000 units	
Oleum Vitaminatum	Vitamin D 100 to 200 units	
	(prophylactic)	
Oleum Vitaminatum	3 to 6 ml.	45 to 90 m.
	Vitamin A 3000 to 6000 units	
	Vitamin D 300 to 600 units	
	(therapeutic)	
Opium Pulveratum.....	0.03 to 0.2 g.	1/2 to 3 gr.
Orthocaina.....	0.1 to 0.2 g.	1 1/2 to 3 gr.
Oxymel.....	2 to 8 ml.	30 to 120 m.
Oxymel Scillæ.....	2 to 4 ml.	30 to 60 m.
Pamaquinum.....	0.02 to 0.04 g.	1/3 to 1/5 gr.
Pancreatinum.....	0.2 to 0.6 g.	3 to 10 gr.
Paraffinum Liquidum.....	7.5 to 30 ml.	1/4 to 1 fl. oz.
Paraldehydum.....	2 to 8 ml.	30 to 120 m.
Pelletierinæ Tannas.....	0.12 to 0.5 g.	2 to 8 gr.
Pepsinum.....	0.3 to 0.6 g.	5 to 10 gr.
Phenacetinum.....	0.03 to 0.4 g.	1/2 to 6 gr.
Phenazonum.....	0.3 to 0.6 g.	5 to 10 gr.
Phenobarbitonum.....	0.03 to 0.12 g.	1/2 to 2 gr.
Phenobarbitonum Solubile.....	0.03 to 0.12 g.	1/2 to 2 gr.
Phenol.....	0.06 to 0.2 g.	1 to 3 gr.
Phenol Liquefactum.....	0.06 to 0.2 g.	1 to 3 m.
Phenolphthaleinum.....	0.06 to 0.3 g.	1 to 5 gr.
Physostigminæ Salicylas.....	0.0006 to 0.0012 g.	1/100 to 1/50 gr.
Pilocarpinæ Nitras.....	0.003 to 0.012 g.	1/2 to 1/5 gr.
Pilula Aloes.....	0.25 to 0.5 g.	4 to 8 gr.
Pilula Aloes et Asafoetidæ.....	0.25 to 0.5 g.	4 to 8 gr.
Pilula Aloes et Ferri.....	0.25 to 0.5 g.	4 to 8 gr.
Pilula Colocynthis et Hyoscyami.....	0.25 to 0.5 g.	4 to 8 gr.
Pilula Ferri Carbonatis.....	0.3 to 2 g.	5 to 30 gr.
Pilula Hydrargyri.....	0.25 to 0.5 g.	4 to 8 gr.
Pilula Rhei Composita.....	0.25 to 0.5 g.	4 to 8 gr.
Pix Liquida.....	0.12 to 0.6 g.	2 to 10 gr.
Plumbi Acetas.....	0.03 to 0.12 g.	1/2 to 2 gr.
Podophylli Resina.....	0.015 to 0.06 g.	1/4 to 1 gr.
Podophyllum.....	0.12 to 0.6 g.	2 to 10 gr.
Podophyllum Indicum.....	0.12 to 0.6 g.	2 to 10 gr.
Potassii Acetas.....	1 to 4 g.	15 to 60 gr.
Potassii Bicarbonas.....	1 to 4 g.	15 to 60 gr.
Potassii Bromidum.....	0.3 to 2 g.	5 to 30 gr.
Potassii Carbonas.....	0.12 to 0.3 g.	2 to 5 gr.
Potassii Chloras.....	0.3 to 0.6 g.	5 to 10 gr.
Potassii Citras.....	1 to 4 g.	15 to 60 gr.
Potassii Iodidum.....	0.3 to 2 g.	5 to 30 gr.
Potassii Nitras.....	0.3 to 1 g.	5 to 15 gr.
Potassii Permanganas.....	0.06 to 0.2 g.	1 to 3 gr.
Potassii Tartaras Acidus.....	1 to 4 g.	15 to 60 gr.

Name	Metric	Imperial
Procainæ Hydrochloridum.....	0.03 to 0.12 g. Up to 1 g. by subcutaneous injection Up to 0.15 g. by intrathecal injection	$\frac{1}{2}$ to 2 gr. Up to 15 gr. Up to $2\frac{1}{2}$ gr.
Prunus Serotina.....	1 to 2 g.	15 to 30 gr.
Pulvis Cretæ Aromaticus.....	0.6 to 4 g.	10 to 60 gr.
Pulvis Cretæ Aromaticus cum Opio.....	0.6 to 4 g.	10 to 60 gr.
Pulvis Glycyrrhizæ Compositus.....	4 to 8 g.	60 to 120 gr.
Pulvis Ipecacuanhæ et Opii.....	0.3 to 0.6 g.	5 to 10 gr.
Pulvis Jalapæ Compositus.....	0.6 to 4 g.	10 to 80 gr.
Pulvis Rhei Compositus.....	0.6 to 4 g.	10 to 60 gr.
Pulvis Tragacanthæ Compositus.....	0.6 to 4 g. 1 to 2 g.	10 to 60 gr. 15 to 30 gr.
Pulvis Vitamini B ₁	100 to 200 units (prophylactic daily doses) 2 to 6 g. 200 to 600 units (therapeutic daily doses)	30 to 90 gr.
Quassia.....	0.12 to 0.5 g.	2 to 8 gr.
Quillaia.....	0.06 to 0.2 g.	1 to 3 gr.
Quinidine Sulphas.....	0.2 to 0.6 g.	3 to 10 gr.
Quininæ Bisulphas.....	0.06 to 0.6 g. 0.06 to 0.6 g.	1 to 10 gr. 1 to 10 gr.
Quininæ Dihydrochloridum.....	0.3 to 0.6 g. by intravenous and intramuscular injection	5 to 10 gr.
Quinine et Æthylis Carbonas.....	0.1 to 1 g.	$1\frac{1}{2}$ to 15 gr.
Quinine Hydrochloridum.....	0.06 to 0.6 g.	1 to 10 gr.
Quininæ Sulphas.....	0.06 to 0.6 g.	1 to 10 gr.
Quininæ Tannas.....	0.1 to 1 g.	$1\frac{1}{2}$ to 15 gr.
Resorcinol.....	0.06 to 0.3 g.	1 to 5 gr.
Rheum.....	0.2 to 1 g.	3 to 15 gr.
Riboflavinum.....	0.001 to 0.01 g.	$\frac{1}{100}$ to $\frac{1}{10}$ gr.
Saccharinum Solubile.....	0.03 to 0.12 g.	$\frac{1}{2}$ to 2 gr.
Salicinum.....	0.06 to 0.2 g.	5 to 15 gr.
Santonium.....	0.06 to 0.2 g.	1 to 3 gr.
Scammoniz Resina.....	0.03 to 0.2 g.	$\frac{1}{2}$ to 3 gr.
Scilla.....	0.06 to 0.2 g.	1 to 3 gr.
Senega.....	0.4 to 0.8 g.	6 to 12 gr.
Sennæ Folium.....	0.6 to 2 g.	10 to 30 gr.
Sennæ Fructus.....	0.6 to 2 g.	10 to 30 gr.
Serpentina.....	0.05 to 0.1 g.	$\frac{3}{4}$ to $1\frac{1}{2}$ gr.
Serum Antidysentericum (Shiga).....	4000 to 10,000 units by injection	
Serum Antipneumococcicum I.....	50,000 to 150,000 units by intravenous injection	
Serum Antipneumococcicum II.....	50,000 to 150,000 units by intravenous injection	
Sodii Benzozas.....	0.3 to 2 g.	5 to 30 gr.
Sodii Bicarbonas.....	1 to 4 g.	15 to 60 gr.
Sodii Bromidum.....	0.3 to 2 g.	5 to 30 gr.
Sodii Carbonas.....	0.3 to 1 g.	5 to 15 gr.
Sodii Carbonas Exsiccatus.....	0.12 to 0.3 g.	2 to 5 gr.
Sodii Citras.....	1 to 4 g.	15 to 60 gr.
Sodii et Potassii Tartras.....	8 to 16 g.	120 to 240 gr.
Sodii Iodidum.....	0.3 to 2 g.	5 to 30 gr.
Sodii Nitris.....	0.03 to 0.12 g.	$\frac{1}{2}$ to 2 gr.
Sodii Phosphas.....	2 to 16 g.	30 to 240 gr.
Sodii Phosphas Acidus.....	2 to 4 g.	30 to 60 gr.
Sodii Phosphas Effervescens.....	4 to 16 g.	60 to 240 gr.
Sodii Salicylas.....	0.6 to 2 g.	10 to 30 gr.
Sodii Sulphas.....	2 to 16 g.	30 to 240 gr.
Sodii Sulphas Effervescens.....	4 to 16 g.	60 to 240 gr.
Sodii Sulphas Exsiccatus.....	1 to 8 g.	15 to 120 gr.
Sodii Thiosulphas.....	0.3 to 1 g. by subcutaneous, intramuscular or intravenous injection	5 to 15 gr.
Spiritus Ætheris.....	1 to 4 ml.	15 to 60 m.

Name	Metric	Imperial
Spiritus Ætheris Nitrosi.....	1 to 4 ml.	15 to 60 m.
Spiritus Ammoniae Aromaticus.....	1 to 4 ml.	15 to 60 m.
Spiritus Cajuputi.....	0.3 to 2 ml.	5 to 30 m.
Spiritus Camphoræ.....	0.3 to 2 ml.	5 to 30 m.
Spiritus Chloroformi.....	0.3 to 2 ml.	5 to 30 m.
Spiritus Menthae Piperitæ.....	0.3 to 2 ml.	5 to 30 m.
Stribophenum.....	0.1 to 0.3 g. by intravenous injection	1 1/2 to 5 gr.
Stilbestrol.....	0.0005 to 0.002 g.	1/120 to 1/30 gr.
Stramonium.....	0.03 to 0.2 g. 0.00025 to 0.001 g.	1/2 to 3 gr. 1/240 to 1/60 gr.
Strophanthinum.....	by intramuscular or intravenous injection	10 to 1 1/8 gr.
Strychninae Hydrochloridum.....	0.002 to 0.008 g.	1/32 to 1/8 gr.
Styrax.....	0.6 to 2 g.	10 to 30 gr.
Sulphanilamidum.....	0.5 to 1 g. 0.1 to 0.6 g.	8 to 15 gr. 1 1/2 to 10 gr.
Sulpharsphenamina.....	by subcutaneous or intramuscular injection	
Sulphonal.....	0.3 to 1.2 g.	5 to 20 gr.
Sulphur Precipitatum.....	1 to 4 g.	15 to 60 gr.
Sulphur Sublimatum.....	1 to 4 g. 1 to 3 g.	15 to 60 gr. 15 to 45 gr.
Suraminum.....	by intravenous injection	
Syrupus Aurantii.....	2 to 8 ml.	30 to 120 m.
Syrupus Ferri Iodidi.....	2 to 8 ml.	30 to 120 m.
Syrupus Ferri Phosphatis Compositus.....	2 to 8 ml.	30 to 120 m.
Syrupus Ferri Phosphatis cum Quinina et Strychnina.....	2 to 4 ml.	30 to 60 m.
Syrupus Ferri Phosphatis cum Strychnina.....	2 to 4 ml.	30 to 60 m.
Syrupus Limonis.....	2 to 8 ml.	30 to 120 m.
Syrupus Pruni Serotinae.....	2 to 8 ml.	30 to 120 m.
Syrupus Scillæ.....	2 to 4 ml.	30 to 60 m.
Syrupus Sennæ.....	2 to 8 ml.	30 to 120 m.
Syrupus Tolutanus.....	2 to 8 ml.	30 to 120 m.
Syrupus Zingiberis.....	2 to 8 ml.	30 to 120 m.
Tabella Glycerylis Trinitratis.....	1 or 2 tablets	
Terebentum.....	0.3 to 1 ml.	5 to 15 m.
Theobromina et Sodii Salicylas.....	0.6 to 1.2 g.	10 to 20 gr.
Theophyllina et Sodii Acetas.....	0.12 to 0.3 g. 0.03 to 0.12 g.	2 to 5 gr. 1/2 to 2 gr.
Thymol.....	1 to 2 g. (anthelmintic doses)	15 to 30 gr.
Thyroideum.....	0.03 to 0.3 g.	1/2 to 5 gr.
Thyroxinsodium.....	0.0001 to 0.001 g.	1/640 to 1/64 gr.
Tinctura Aconitidis.....	2 to 4 ml.	30 to 60 m.
Tinctura Aurantii.....	2 to 4 ml.	30 to 60 m.
Tinctura Aurantii Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Belladonnae.....	0.3 to 2 ml.	5 to 30 m.
Tinctura Benzoini Composita.....	2 to 4 ml.	30 to 60 m.
Tinctura Calumbæ.....	2 to 4 ml.	30 to 60 m.
Tinctura Capsici.....	0.3 to 1 ml.	5 to 15 m.
Tinctura Capsici Concentrata.....	0.06 to 0.25 ml.	1 to 4 m.
Tinctura Cardamomi Composita.....	2 to 4 ml.	30 to 60 m.
Tinctura Cardamomi Composita Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Catechu.....	2 to 4 ml.	30 to 60 m.
Tinctura Cinchonæ.....	2 to 4 ml.	30 to 60 m.
Tinctura Cinchonæ Composita.....	2 to 4 ml.	30 to 60 m.
Tinctura Cinchonæ Composita Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Cocci.....	0.3 to 1 ml.	5 to 15 m.
Tinctura Colchici.....	0.3 to 1 ml.	5 to 15 m.
Tinctura Digitalis.....	0.3 to 1 ml. 2 to 6 ml.	5 to 15 m. 30 to 90 m.
Tinctura Gentianæ Composita.....	2 to 4 ml.	30 to 60 m.
Tinctura Gentianæ Composita Concentrata.....	0.5 to 1 ml.	8 to 15 m.

Name	Metric	Imperial
Tinctura Hyoscyami.....	2 to 4 ml.	30 to 60 m.
Tinctura Ipecacuanhæ.....	0.6 to 2 ml. 15 to 30 ml.	10 to 30 m. 1½ to 1 fl. oz.
Tinctura Krameriæ.....	2 to 4 ml.	(emetic doses) 30 to 60 m.
Tinctura Limonis.....	2 to 4 ml.	30 to 60 m.
Tinctura Limonis Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Lobeliæ Ætherea.....	0.3 to 1 ml.	5 to 15 m.
Tinctura Lobeliæ Ætherea Concentrata.....	0.08 to 0.25 ml.	1½ to 4 m.
Tinctura Myrrhæ.....	2 to 4 ml.	30 to 60 m.
Tinctura Nucis Vomice.....	0.6 to 2 ml.	10 to 30 m.
Tinctura Opii.....	0.3 to 2 ml.	5 to 30 m.
Tinctura Opii Camphorata.....	2 to 4 ml.	30 to 60 m.
Tinctura Opii Camphorata Concentrata.....	0.25 to 0.5 ml.	4 to 8 m.
Tinctura Quassie.....	2 to 4 ml.	30 to 60 m.
Tinctura Quassie Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Quillaie.....	2 to 4 ml.	30 to 60 m.
Tinctura Rhei Composita.....	2 to 4 ml.	30 to 60 m.
Tinctura Scillæ.....	0.3 to 2 ml.	5 to 30 m.
Tinctura Senegæ.....	2 to 4 ml.	30 to 60 m.
Tinctura Stramonii.....	0.3 to 2 ml.	5 to 30 m.
Tinctura Strophanthi.....	0.12 to 0.3 ml.	2 to 5 m.
Tinctura Tolutana.....	2 to 4 ml.	30 to 60 m.
Tinctura Tolutana Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Valerianæ Ammoniata.....	2 to 4 ml.	30 to 60 m.
Tinctura Valerianæ Ammoniata Concentrata.....	0.5 to 1 ml.	8 to 15 m.
Tinctura Zingiberis Fortis.....	0.3 to 0.6 ml.	5 to 10 m.
Tinctura Zingiberis Mitis.....	2 to 4 ml.	30 to 60 m.
Totaquina.....	0.06 to 0.6 g.	1 to 10 gr.
Toxinum Diphthericum Calefactum.....	0.2 ml.	3 m.
Toxinum Diphthericum Detoxicatum.....	by intradermal injection The volume indicated on the label as the dose, on two or three occasions, at intervals of two or four weeks, by subcutaneous injection	
Toxinum Diphthericum Diagnosticum.....	0.2 ml.	3 m.
Toxinum Tetanicum Detoxicatum.....	0.5 to 1 ml.	8 to 15 m.
Trinitrophenol.....	by subcutaneous or intramuscular injection	
Tryparsamidum.....	0.06 to 0.3 g.	1 to 5 gr.
	1 to 2 g.	15 to 30 gr.
	by subcutaneous, intramuscular or intravenous injection	
	0.001 to 0.005 ml.	1/60 to 1/12 m.
	by subcutaneous injection (diagnostic)	
Tuberculinum Pristinum.....	0.000001 ml.,	1/100,000 m.
	gradually increased gradually increased by subcutaneous injection (therapeutic)	
Urea.....	1 to 16 g.	15 to 240 gr.
Urethanium.....	1 to 2 g.	15 to 30 gr.
Urginea.....	0.06 to 0.2 g.	1 to 3 gr.
Vaccinum Typho-Paratyphosum.....	0.5 ml. (first dose) 1.0 ml. (second dose after 7 to 10 days interval)	by subcutaneous injection
Vaccinum Vacciniæ.....	0.06 ml.	1 m.
Valeriana.....	0.3 to 1 g.	5 to 15 gr.
Valeriana Indica.....	0.3 to 1 g.	5 to 15 gr.
Zinci Oxidum.....	0.3 to 0.6 g.	5 to 10 gr.
Zinci Sulphas.....	0.06 to 0.2 g.	1 to 3 gr.
	0.6 to 2 g.	10 to 30 gr.
Zingiber.....	0.3 to 1 g.	(emetic doses) 5 to 15 gr.

DOSES PROPORTIONATE TO AGE

APPROXIMATELY ACCORDING TO DR. YOUNG'S METHOD
OF DETERMINING DOSES

Age	Proportional Doses			
Adult	1 grain or minim	1 drachm or fluid drachm	1 ounce or fluid ounce	
12 years	$\frac{1}{2}$ " " "	30 grains or minims	4 drachms or fluid drachms	
8 "	$\frac{2}{5}$ " " "	24 " " "	192 grains or minims	
4 "	$\frac{1}{4}$ " " "	15 " " "	2 drachms or fluid drachms	
2 "	$\frac{1}{8}$ " " "	7 " " "	1 drachm or fluid drachm	
1 "	$\frac{1}{16}$ " " "	3 " " "	$\frac{1}{2}$ drachm or fluid drachm	

To this scale of proportionate doses there are various well-known exceptions; thus calomel, belladonna, hyoscyamus and arsenic are tolerated by children in larger proportionate doses, while opium and narcotics generally may be, even in small doses, dangerous to infants.

EQUIVALENT METRIC AND IMPERIAL DOSES

The following table gives the equivalent doses suggested by the B.P.

Millilitres	Minims	Millilitres	Minims	Millilitres	Minims
Grammes	Grains	Grammes	Grains	Grammes	Grains
10	.. 150	1	.. 15	0.1	.. $1\frac{1}{2}$
8	.. 120	0.8	.. 12	0.08	.. $1\frac{1}{8}$
6	.. 90	0.6	.. 10	0.06	.. 1
5	.. 75	0.5	.. 8	0.05	.. $\frac{4}{5}$ or $\frac{3}{4}$
4	.. 60	0.4	.. 6	0.04	.. $\frac{3}{4}$
3	.. 45	0.3	.. 5	0.03	.. $\frac{2}{3}$
2.6	.. 40	0.25	.. 4	0.025	.. $\frac{1}{2}$
2	.. 30	0.2	.. 3	0.02	.. $\frac{1}{2}$
1.6 or 1.5	25	0.15	.. $2\frac{1}{2}$	0.016	.. $\frac{1}{4}$
1.2 or 1.3	20	0.12	.. 2	0.012	.. $\frac{1}{4}$

Gramme	Grain	Gramme	Grain
0.01	.. $\frac{1}{8}$	0.001	.. $\frac{1}{80}$ or $\frac{1}{80}$
0.008	.. $\frac{1}{10}$	0.0008	.. $\frac{1}{125}$
0.006	.. $\frac{1}{16}$	0.0006	.. $\frac{1}{160}$
0.005	.. $\frac{1}{20}$	0.0005	.. $\frac{1}{200}$
0.004	.. $\frac{1}{25}$	0.0004	.. $\frac{1}{250}$
0.003	.. $\frac{1}{30}$	0.0003	.. $\frac{1}{300}$
0.0025	.. $\frac{1}{40}$	0.00025	.. $\frac{1}{400}$
0.002	.. $\frac{1}{50}$	0.0002	.. $\frac{1}{500}$ or $\frac{1}{500}$
0.0015	.. $\frac{1}{60}$	0.00015	.. $\frac{1}{600}$
0.0012	.. $\frac{1}{80}$	0.00012	.. $\frac{1}{800}$

ABBREVIATIONS USED IN PRESCRIPTIONS

Abbreviations of the names of substances and preparations used in medicine are not included. They may be found in the British Pharmacopœia and British Pharmaceutical Codex; others which are unofficial may be found in the section of this book entitled Dictionary of Synonyms and Trade Names.

- a.c. : ante cibum, *before food*.
a.h. : alternis horis, *every other hour*.
a.j. : ante jentaculum, *before breakfast*.
a.m. : ante meridiem, *before noon*.
a.p. : ante prandium, *before dinner*.
aa. : ana, *of each*.
abd. : abdomen, *the belly*.
abs. febr. : absente febris, *fever being absent*.
ad alv. excitand. : ad alvum excitandum, *to stimulate the bowels*.
ad defec. anim. : ad defectionem animi, *to fainting*.
ad deliq. anim. : ad deliquium animi, *to fainting*.
ad { 2 vic. : ad duas vices, *for two times (twice)*.
 { 3 vic. : ad tres vices, *for three times (thrice)*.
ad gr. acid. : ad gratam aciditatem, *to an agreeable acidity*.
ad lib. : ad libitum, *at pleasure, to any extent*.
ad neutral. : ad neutralisandum, *to neutralisation*.
ad nuc. mosch. m. : ad nucis moschatæ magnitudinem, *a piece the size of a nutmeg*.
ad recid. præc. : ad recidivum præcavendum, *to prevent a relapse*.
ad sat. : ad saturandum, *to saturation*.
ad { secund. } vic. : ad { secundam } vicem, *for the { 2nd } time*
 { 3tiar. } { tertiam } { 3rd }
add. : adde, *add (imperative)*.
addend. : { addendus, a, um, *to be added*.
 { addendo, *by adding* (gerund with accusative).
admov. : { admove, *apply* (imperative); admoveatur, *let it be applied*.
 { admoveantur, *let them be applied*.
ads. febr. : adstante febris, *while fever is present*.
adv. : adversus or adversum (with accus.), *against*.
æg. : æger, ægra, *the patient*.
aggr. febr. : aggrediente febris, *while fever is coming on*.
alt. : altera (pars), *the remainder*; alternus, a, um, *alternate*.
altern. d. : alterno die, }
altern. dieb. : alternis diebus, } *every other day*.
altern. hor. : alterna hora, or alternis horis, }
altern. qq. hor. : alterna quæquæ hora, } *every other hour*.
alv. adstrict. : alvo adstricta, *the bowels being confined*.
alv. laxat. : alvo laxata, *the bowels being relaxed*.
amp. : amplus, a, um, *full, large*, also ampulla, *ampoule*.

- ante, before { cœn. : cœnam, *supper* (often *dinner*).
jentic. : jentaculum, *breakfast*.
prand. : prandium, *dinner*.
- aper. : aperiens, *an aperient*.
- applic. : { applicandus, a, um, *to be applied*.
applicatio, *an application*.
- applectr. : applicetur, applicentur, *let it, let them, be applied*.
- aq. : aqua, *water*.
- Aq. ad— : Aquam ad — (governed by Recipe).
- aq. bull. : aqua bulliens (entis), *boiling water*.
- aq. calid. : aqua calida, *hot water*.
- aq. comm. : aqua communis, *common or plain water*.
- aq. dest. : aqua destillata, *distilled water*.
- aq. ferv. : aqua fervens (entis), *warm or hot water*.
- aq. fluv. : aqua fluvialis, *river water*.
- aq. font. : aqua fontana; or aqua fontis, *spring water*.
- aq. gel. : aqua gelida, *cold water*.
- aq. mar. : aqua marina, *sea-water*.
- aq. pluv. : aqua pluvialis, *rain water*.
- aq. pur. : aqua pura, *pure water* [filtered, not distilled].
- Aquæ ad— (quantum sufficiat, or quantitatem sufficientem understood):
water up to—.
- arg. : argentum, *silver*.
- aur. : aurum, *gold*; auris, *the ear*.
- aur. dextr. (læv.) : auri dextræ (lævæ), *to right (left) ear*.
ad. aur. : ad aurem, *to the ear*.
p. aur. : pone aurem, *behind the ear*.
- b. : bis, *twice*.
- b.m. : balneum mariæ, *water-bath*; b. maris, *sea-water bath*.
- B.P. *British Pharmacopœia*.
- B.P.C. : *British Pharmaceutical Codex*.
- b.t. : balneum tepidum, *a tepid bath*.
- b.v. : balneum vaporis, *a vapour bath*.
- bals. : balsamum, *balsam*.
- bib. : bibe, *drink*.
- bid. : biduum, *two days*.
- bis { d. : bis die } or bis in d. : { bis in die } *twice a day*.
d.d. : bis de die }
bis in dies }
- brach. : brachium, *the arm*.
- brev. : brevis, *e, short*.
- bull. : bulliens, *boiling*.
- but. : butyrum, *butter*.
- C. : congius, *a gallon*. C. : centum, 100. c. : cum, *with*.
- c.c. : cubic centimetre.
- cg. (also cgr., cgm.) : centigramma, *a centigramme*.
- c. l. q. s. : cuilibet quantum sufficit, *as you please, a sufficient quantity*.
- c.m. : cras mane, *to-morrow morning*; c.m.s. : cras mane sumendus, a,
um, *to be taken to-morrow morning*.
- c.n. : cras nocte, *to-morrow night*.
- c.v. : cras vespere, *to-morrow evening*.

- c. vin. : cyathus vinosus or vinarius, a wine-glass.
 calid. : calidus, a, um, warm.
 { capiat, let him take.
 cap. : capiat, let it be taken.
 { capiantur, let them be taken.
 { capsula, a capsule.
 cib. : cibus, food.
 circ. : circa, around; or circiter, about.
 cml. : centimillilitre.
 co. : compositus, a, um, compound.
 coch. : cochleare, spoonful [from cochlea, a snail's shell].
 coch. amp. : cochleare amplum a tablespoonful.
 coch. mag. : cochleare magnum
 coch. med. : cochleare medium a dessertspoonful.
 coch. mod. : cochleare modicum
 coch. min. : cochleare minimum
 coch. parv. : cochleare parvum a teaspoonful.
 cochleat. : cochleatim, by spoonfuls.
 col. : { cola, strain (imperative); colatus, a, um, strained.
 { colatura, æ (subs.), the strained portion.
 { coletur, let it be strained; colentur, let them be strained.
 collut. : collutorium, a mouth-wash.
 collyr. : collyrium, an eye-lotion.
 comp. : compositus, a, um, compound.
 conc. : concentratus, concentrated, or concisus, sliced.
 conf. : confectio, a confection.
 cong. : congius, a gallon.
 conserv. : { conserva, æ, a conserve.
 { conserva, keep (imperative).
 cont. : contusus, a, um, bruised.
 cont. rem. or med. : continuentur remedia, or medicamenta, let the remedies be continued.
 contrit. : contritus, pounded.
 coq. : coque, boil (imperative).
 coq. ad. med. consumpt. : coque ad medietatis consumptionem, boil down to half.
 coq. in s. a. : coque in sufficiente (quantitate) aquæ, boil in a sufficient quantity of water.
 coq. s. a. : coque secundum artem, boil according to art.
 cort. : cortex, icis, bark.
 crast. : crastinus, for to-morrow.
 cryst. : { crystallus, a crystal.
 { crystallisatus, a, um, crystallised.
 cuj. : cujus, of which.
 cujusl. : cujuslibet, of any.
 cyath. : cyathus, glass.
 cyath. vinos. : cyathus vinosus, wine-glass.
 d. : dosis, dose, or dies, a day.
 d. d. : de die, daily.
 d. in dup. : detur in duplo, let twice as much be given.
 d. in p. æq. : divide in partes æquales, divide into equal parts.

- d.p. : directione propria, *with a proper direction.*
d.p.c. : dosi pedetentim crescente, *the dose gradually increasing.*
d.s. : { da, signa, give and label.
 { detur, signetur, let it be given and labelled.
d. secund., tert., etc. : diebus secundis, tertiis, etc., *every second, third day, etc.*
d. seq. : die sequente, *on the following day.*
d. spiss. : debita spissitudine, *with a proper consistence.*
d. t. d. : dentur tales doses, *let such doses be given.*
de d. in d. : de die in diem, } *daily, or from day to day.*
de d. : de die,
deaur. pil. : deaurentur pilulæ, *let the pills be gilded.*
dec. : decoctum, *a decoction.*
decub. : decubitus, *lying down.*
deglut. : deglutiat, *let it be swallowed.*
dej. alv. : dejectiones alvi, *motions.*
dent. ad scat. : dentur ad scatulum, *let them be put in a box.*
dest. : destillatus, a, um, *distilled.*
det. : detur, *let it be given.*
dext. lat. : dextro lateri, *to the right side.*
dieb. altern. : diebus alternis, *every other day.*
dil. : dilutus, a, um, *diluted.*
diluc. : diluculo, *at break of day.*
dim. : dimidium (subs.), *the half*; dimidius, a, um, *half.*
div. : divide, *divide.*
donec alv. bene respond. : donec alvus bene responderit, *until the bowels have been well opened.*
donec alv. bis dej. : donec alvus bis dejecerit, *until the bowels have acted twice.*
donec alv. solut. fuer. : donec alvus soluta fuerit, *until the bowels have acted.*
donec dol. exulav. : donec dolor exulaverit [*also exsulaverit*], *until the pain is relieved.*
dos. : dosis, *a dose.*
dr. : drachma, *a drachm.*
dulc. : dulcis, e, *sweet.*
dup. : } duplex, *double.*
dx. : }
dur. : durus, a, um, *hard.*
e.g. : exempli gratia, *for instance.*
E.P. : Extra Pharmacopœia.
e gel. vit. : e gelatina vituli, *in calf's foot jelly.*
e paul. aq. : e paulo aquæ, *in a little water.*
e quol. vehic. idon. : e quolibet vehiculo idoneo, *in any suitable vehicle.*
ead. : eadem, *the same.*
ed. : [old] edulcoratus, a, um, *purified by washing.*
ejusd. : ejusdem, *of the same.*
elect. : electuarium, *an electuary.*
elect. : [commercial] electus, a, um, *picked, select, choice.*
emet. : emeticum, *an emetic.*
emp. : emplastrum, *a plaster.*

- enem. : enema, n., *an enema*.
 esur. : esuriens, *fasting, i.e., before food*.
 evac. : evacuatio, *a motion*.
 ex aq. : ex aqua, *in water*.
 ex aq. coch. ampl. : ex aquæ cochleari amplo, *in a tablespoonful of water*.
 ex aq. cyath. vinos. : ex aquæ cyatho vinoso, *in a wine-glass of water*.
 ex paul. : ex paulo (e paulo), *in a little*.
 exhib. : exhibeatur, *let it be exhibited*.
 exprim. : exprime, *express*.
 ext. : extractum, *an extract*.
 ext. sup. alut. moll. : extende super alutam mollem, *spread it on soft leather*.
 extemp. : ex tempore, *extemporary, on the spur of the moment*.
 extempl. : extemplo, *immediately*.
 extend. : extende, *spread*.
 f., ft. : fiat (fiant), *let it (them) be made*.
 f. l. a. : fiat lege artis, *let it be made according to rule*.
 f. m. or ft. mist. : fiat mistura, *let a mixture be made*.
 f. s. a. : fiat secundum artem, *let it be made according to art*.
 feb. dur. : febri durante, *during the fever*.
 fem. intern. : femoribus internis, *to the inner part of the thighs*.
 filtr. : filtra, *filter*; filtrum, *a filter*.
 fl. : fluidus, *liquid*.
 flav. : flavus, a, um, *yellow*.
 fol. : folium, *a leaf*.
 fort. : fortis, e, *strong*.
 frigid. : frigidus, a, um, *cold*.
 frust. : frustum, *a small portion*; frustillatim, *little by little*.
 ft. haust. : fiat haustus, *let a draught be made*.
 ft. pil. : fiat pilula, or fiant pilulæ, *let a pill, or pills, be made*.
 ft. pulv. : fiat pulvis, *let a powder be made*.
 fusc. : fuscus, a, um, *brown*.
 g., gm., grm. : gramma, *a gramme*.
 gall. : gallicus, *French*.
 garg. : gargarisma, *a gargle*.
 gel. quav. : gelatina quavis, *in any kind of jelly*.
 gr. : granum, *a grain*.
 grad. : gradatim, *by degrees*.
 gtt. : guttæ, *drops*; guttat. : guttatim, *drop by drop*.
 guttur. appl. : gutturi applicandus, a, um, *to be applied to the throat*.
 h. : hora, *at the hour of* [ablative].
 h. d. : hora decubitus, *at bedtime*.
 h. f. : hujus formæ, *of this shape* (emplast.).
 h. s. : hora somni, *at bedtime*.
 hab. : { habeat, *let him have (or take)*.
 { habeantur, *let them be taken*.
 har. pil. iij. s. : harum pilulæ tres sumantur, *let three of these pills be taken*.
 haust. : haustus, *a draught*.
 hebdom. : hebdomada (acc.), *for a week*.
 hor. intern. : horis intermediis, *in the intermediate hours*.

- hor. un. spat. : horæ unius spatio, *at the expiration of one hour.*
 hst. : haustus, *a draught.*
 hst. t. d. s. : haustus ter die sumendus, *the draught to be taken three times a day.*
 id. : idem, *the same.*
 impet. efferv. : impetu effervescentiæ, *during effervescence.*
 imprans. : impransus, a, um, *fasting.*
 in d. : in dies, *from day to day.*
 in decoct. hord. : in decocto hordei, *in barley water.*
 in fol. arg. vol. : in folio argenti volvendas, *rolled in silver leaf.*
 in p. æq. : in partes æquales, *in (i.e., into) equal parts.*
 in pulm. : in pulmento, *in gruel.*
 incis. : incisus, a, um, *cut, sliced.*
 inf. : infusum, *an infusion.*
 infric.: { infricetur, *let it be rubbed in.*
 { infricandus, a, um, *to be rubbed in.*
 infund : infunde, *pour in.*
 infus. : infusa, *infuse.*
 inj. : injectio, *an injection.*
 inj. enem. : injiciatur enema, *let an enema be administered.*
 inj. hyp. : injectio hypodermica, *a hypodermic injection.*
 insip. : insipidus, a, um, *tasteless.*
 insp. : inspissare, *to thicken.*
 int. : inter, *between.*
 intim. : intime, *intimately.*
 involv. : involve, *to roll in.*
 jentac. : jentaculum, *breakfast.*
 jusc. : jusculum, *broth.*
 jusc. aven. : jusculum avenaceum, *gruel.*
 l. : lac, *milk.*
 lat. dol. : lateri dolenti, *to the affected side.*
 lb., lib. : libra, *a pound.*
 lig. : lignum, *wood.*
 lin. p. a. infr. : linimentum parti affectæ infricandum, *the liniment to be rubbed on the affected part.*
 liq. : liquor, *a solution.*
 lot. : lotio, *a lotion.*
 luc. p. : luce prima, *early in the morning (at the first light).*
 m. : mane, *in the morning.*
 m. : minimum, *a minim.*
 m. : misce. mix (bene), *well; (intime), thoroughly.*
 (s.a. : secundum artem), *pharmaceutically.*
 m. d. : more dicto, *as directed.*
 M. D. S. : misce, da, signa, *mix, give, and label.*
 m. d. u. : more dicto utendus, *to be used as directed.*
 m. et v. : mane et vespere, *morning and evening.*
 m. ft. mist. : misce, fiat mistura, *mix, and let a mixture be made.*
 m. p. : mane primo, *early in the morning; or, mica panis, a crumb of bread; or, massa pilularum, a pill mass.*

m. q. dx. : mitte quantitatem duplicem, *send double quantity.*

m. s. : more solito, *in the usual manner.*

man. : manipulus, *a handful.*

mass. : massa, *a pill mass.*

mg., mgr., mgrm. : milligramma, *a milligram.*

mic. pan. : mica panis, *a crumb of bread.*

mil. : millilitra, *millilitre.*

min. : minimum, *a minim.*

mist. : mistura, *a mixture.*

mitt. : $\left\{ \begin{array}{l} \text{mitte, send.} \\ \text{mittatur, let it be sent.} \end{array} \right.$

mittantur, *let them be sent.*

mitt. in phial. : mittantur in phialam, *let them be put into a phial.*

ml. : millilitra, *millilitre.*

mod. or $\left\{ \begin{array}{l} \text{dict. :} \\ \text{præs. :} \end{array} \right\}$ modo $\left\{ \begin{array}{l} \text{dicto,} \\ \text{præscripto,} \end{array} \right\}$ *as prescribed.*

moll. : mollis, *e, soft.*

n. : nocte, *at night.*

N.F. : *National Health Insurance Formulary.*

N.W.F. : *National War Formulary.*

n. m. : nux moschata, *nutmeg.*

n. et m. or n. mque : nocte maneque, *night and morning.*

ne tr. s. num : ne tradas sine nummo, *do not deliver unless paid.*

neb. : nebula, *a spray.*

nig. : niger, ra, rum, *black.*

nim. : nimis, *too much.*

no. : numero, *in number.*

noct. : nocte, *at night.*

nov. : novus, a, um, *new.*

o. : octarius, *a pint.*

o. alt. hor. : omnibus alternis horis, *every other hour.*

o. m. : omni mane, *every morning; or, oleum morrhuae, cod-liver oil.*

o. n. : omni nocte, *every night.*

ol. : oleum, *oil.*

omn. bid. : omni biduo, *every two days.*

op. : ope, *by means of; alcoholis, spirit; luti, luting.*

opt. : optimus, *best.*

ov. : ovum, *an egg.*

ov. vitell. sol. : ovi vitello solutum, *dissolved, i.e., suspended, in yolk of egg.*

oz. : uncia, *an ounce (avoirdupois).*

P. : pondere, *by weight.*

p. a. a. : parti affectæ applicandus, a, um, *to be applied to the affected part.*

p. æq. : partes æquales, *equal parts.*

P. B. or Ph. B. : *Pharmacopœia Britannica.*

p. c. : per centum, *per cent.*

p. d. : pro dosi, *for a dose.*

p. m. : post meridiem, *afternoon; primo mane, early in the morning.*

pp. : partes, *parts.*

p. p. a. : phiala prius agitata, *the bottle having been previously shaken.*

- p. r. n. : pro re nata, *occasionally, when required.*
 part. affect. : parti affectæ, *to the affected part.*
 part. dolent. : parti dolenti, *to the painful part.*
 part. vic. : partitis vicibus, *in divided doses.*
 parv. : parvus, a, um, *small.*
 past. : pasta, *a paste*; pastillus, *a pastille.*
 ped. : pedetentim, *gradually.*
 per bid., trid. : per biduum, triduum, *for a period of two, or three, days.*
 peract. op. emet. : peracta operatione emetic (or, emetica), *when the operation of the emetic is finished.*
 pess. : pessus, *a pessary.*
 Ph., *Pharmacopœia.* Continental, *Pharmacopœa.*
 Ph. B. : Britannica (*British*).
 Ph. D. : Dublinensis (*Dublin*).
 Ph. E. : Edinburgensis, Edinensis (*Edinburgh*).
 Ph. G. or Germ. : Pharmacopœa Germanica (*German*).
 Ph. Gall. : Pharmacopœa Gallica, or, Codex Medicamentarius (*French*).
 Ph. Helv. : Pharmacopœa Helvetica (*Swiss*).
 phial : phiala, *a phial.*
 pig. : pigmentum, *a paint.*
 poc. : poculum, *a cup.*
 pond. : ponderosus, a, um, *heavy.*
 post jentac. : post jentaculum, *after breakfast.*
 post prand. : post prandium, *after dinner.*
 post qq. evac. : post quamque evacuationem, *after each motion.*
 post sing. sed. liq. : post singulas sedes liquidas, *after each liquid motion.*
 ppt. : precipitatus, a, um, *precipitated.*
 præp. : præparatus, a, um, *prepared.*
 pro pot. s. : pro potu sumendus, a, um, *to be taken as a drink.*
 pro rat. æt. : pro ratione ætatis, *according to age.*
 prox. luc. : proxima luce [*old*], *on the next day.*
 pulv. : { pulverisatus, a, um, *powdered.*
 { pulvis, *a powder.*
 pulv. hum. : pulvinar humuli, *a hop pillow.*
 pv. : parvus, a, um, *small.*
 q. d. : quater die, *four times a day.*
 q. dx. : quantitas duplex, *a double quantity.*
 q. l. : quantum libet,
 q. p. : quantum placet, } *as much as you please.*
 qq. : quaque, *every.*
 q. q. h., 4ta qq. hor. : quarta quaque hora, *every fourth hour.*
 q. s. : quantum sufficiat, quantus sufficiens, or quantum satis, *sufficient.*
 q. v. : quantum volueris, *as much as you please.*
 q. v. : quod vide, *which see.*
 quant. fab. : quantitas fabæ, *a piece the size of a bean.*
 quant. nuc. : quantitas nucis, *a piece the size of a nut.*
 quant. nuc. avell. : quantitas nucis avellanæ, *a piece the size of a filbert.*
 quant. nuc. jugl. : quantitas nucis juglandis, *a piece the size of a walnut.*
 quart. : quartus, a, um, *the fourth.*
 quat. : quater, *four times.*
 quot. mane. : quolibet mane, *any morning.*

R_x : recipe, *take*.

r. in pulv. : redactus in pulverem, *reduced to powder*.

rad. : radix, *a root*.

ras. : rasuræ, *shavings*.

rect. : rectificatus, a, um, *rectified*.

redig. in pulv. : redigatur in pulverem, *let it be reduced to powder*.

reg. : regioni, *to the region*.

reg.	<table border="0"> <tr> <td>{</td> <td>cor. :</td> <td rowspan="4">{</td> <td rowspan="4">Regioni</td> <td rowspan="4">{</td> <td>cordis, of the heart.</td> </tr> <tr> <td>epigast. :</td> <td>epigastricæ, pit of the stomach.</td> </tr> <tr> <td>hepat. :</td> <td>hepatis, of the liver.</td> </tr> <tr> <td>umbilic. :</td> <td>umbilici, of the navel.</td> </tr> </table>	{	cor. :	{	Regioni	{	cordis, of the heart.	epigast. :	epigastricæ, pit of the stomach.	hepat. :	hepatis, of the liver.	umbilic. :	umbilici, of the navel.
{	cor. :	{	Regioni				{	cordis, of the heart.					
epigast. :	epigastricæ, pit of the stomach.												
hepat. :	hepatis, of the liver.												
umbilic. :	umbilici, of the navel.												

rep. : { repetat, *let him repeat*.

{ repetatur, *let it be repeated*.

{ repetantur, *let them be repeated*.

{ sumat, *let him take*.

s. : { sumatur, *let it be taken*.

{ sumantur, *let them be taken*.

{ sumendus, a, um, *to be taken*.

s.a. : secundum artem, *according to art, i.e., with pharmaceutical skill*.

s.d. : sic dictus, a, um, *so called*.

s.g. : (or sp. gr.), *specific gravity*.

s.i. : sine igne, *without heat, cold drawn*.

s.o.s. : si opus sit, *if there is need, if occasion requires, if necessary*.

ss. : semisse (abl.), from semis, *semissis (gen.), the half*.

Also, s.s. : sine sale, *without salt* [adepts].

s.s.s. : stratum super stratum, *layer upon layer*.

S.V.M. : spiritus vini methylatus, *methylated spirit*.

S.V.R. : spiritus vini rectificatus, *rectified spirit*.

S.V.T. : spiritus vini tenuior, *proof spirit*.

sanguisug. vj. : sanguisugæ sex, *six leeches*.

scat. : scatula, *a box*.

scrob. cord. : scrobiculo cordis, *to the pit of the stomach*.

semidr. : semidrachma, *half a drachm*.

semih. : semihora, *half an hour*.

seq. luc. : sequenti luce, *the following day*.

serv. : serva, *keep*.

sesquih. : sesquihora, *an hour and a half*.

sesunc. : sesuncia, *an ounce and a half*.

si n. val. : si non valeat, *if it does not answer*.

si vir. perm. : si vires permittant, *if the strength permit*.

sig. : signa, signetur, signentur, *label, let it (them) be labelled*.

sing. : singulorum, *of each*.

sing. auro. : singulis aurosis, *every morning*.

sing. hor. quad. : singulis horæ quadrantibus, *every quarter of an hour*.

solv. : solve, *dissolve*; also solvellæ, *solution-tablets*.

st. : stet, stent, *let it (them) stand*.

stat. : statim, *immediately*.

stat. eff. : statu effervescentiæ, *whilst effervescing*.

sub fin. coct. : sub finem coctionis, *when sufficiently boiled down* [at the end of the boiling].

suff. : sufficiens, *sufficient*.

- sum. : { sumat, *let him take.*
 { sumatur, *let it be taken.*
 { sumantur, *let them be taken.*
 { sumendus, *to be taken.*
- sum. tal. : sumat talem, *tales, let the patient take one (or more) such.*
- sumend. : sumendus, a, um, *to be taken.*
- supp. : suppositorium, *a suppository.*
- syr. : syrupus, *syrup.*
- t. : ter, *thrice.*
- t. d. d. : ter de die, *thrice a day.*
- t. d. s. : ter die sumendus, a, um, *to be taken three times a day.*
- t. i. d. : ter in die, *three times a day.*
- tab. : tabletta, *or tabella, a tablet.*
- temp. dext. : tempori dextro, *to the right temple.*
- ter. sim. : tere simul, *rub together.*
- tr. : tinctura, *a tincture.*
- trit. : tritura, *triturate.*
- troch. : trochiscus, *a lozenge.*
- tuss. : tussis, *a cough.*
- tuss. urg. : tussi urgente, *when the cough is troublesome.*
- U.S.P. : *Pharmacopœia of the United States.*
- ult. præscrip. : ultimo præscriptus, a, um, etc., *the last ordered.*
- ung. : unguentum, *an ointment.*
- ut dict. : ut dictum, *as directed.*
- ut direct. : ut directum, *as directed.*
- ut supr. : ut supra, *as above.*
- v. : vespere, *in the evening.*
- v.o.s. : vitello ovi solutus, a, um, *dissolved, i.e., suspended, in yolk of egg.*
- vit. : vitellus, *the yolk.*
- vs. : venæsectio, *bleeding.*

IMPERIAL WEIGHTS AND MEASURES

IMPERIAL MEASURES OF LENGTH

1 Inch	=	25·3999 millimetres
1 Foot (12 in.)	=	{ 304·7997 millimetres 0·3047997 metre
1 Yard (3 ft.)	=	{ 914·3992 millimetres 0·9143992 metre
1 Mile (1760 yd.)	=	1·6093 kilometres

Conversion of Imperial to Metric Units

Inches ÷ 0·0394=millimetres	Inches × 0·2539=decimetres
Inches × 25·3999=millimetres	Inches ÷ 39·3701=metres
Inches ÷ 0·3937=centimetres	Inches × 0·0254=metres
Inches × 2·5399=centimetres	Miles ÷ 0·6214=kilometres
Inches ÷ 3·9370=decimetres	Miles × 1·6093=kilometres

IMPERIAL WEIGHTS OR MEASURES OF MASS

1 Grain	=	{ 0·0648 gramme 64·7989 milligrams
1 Scruple (20 grains)	=	1·2959 grammes
1 Drachm (60 grains)	=	3·8879 grammes
1 Troy or Apothecaries' Ounce (480 grains)	=	31·1035 grammes
1 Avoirdupois Ounce (437·5 grains) ..	=	28·3495 grammes
1 Pound (7000 grains)	=	{ 453·5924 grammes 0·4536 kilogram

Conversion of Imperial to Metric Units

Grains ÷ 15·4324=g.	Ounces (Troy) × 31·1035=g.
Grains × 0·0648=g.	Ounces (Av.) ÷ 0·0353=g.
Scruples (Ap.) × 1·2959=g.	Ounces (Av.) × 28·3459=g.
Drachms (Ap.) × 3·8879=g.	Pounds (Av.) ÷ 2·2046=kg.
Ounces (Troy) ÷ 0·0311=g.	Pounds (Av.) × 0·4536=kg.

IMPERIAL MEASURES OF CAPACITY

1 Minim (0.9114583 grain of water)*=	0.0592 millilitre
1 Fluid drachm (60 m. or 54.6875 gr.) =	3.5515 millilitres
(or one teaspoonful)	
1 Fluid ounce (8 fl. dr. or 437.5 gr.) =	28.4123 millilitres
(or two tablespoonfuls)	0.0284 litre
1 Pint (20 fl. oz. or 8750 grains) =	568.2454 millilitres
	0.5682 litre
1 Gallon (8 pints or 70,000 grains) =	4545.9631 millilitres
	4.5460 litres
*100 fl. grains =	109.714 minims

SIGNS USED IN PRESCRIPTIONS

ss or fs, half; ℥i, one minim; gr. i, one grain; ℥i, one scruple or 20 grains
 ʒi, one drachm or 60 minims by measure, also 60 grains by weight;
 ʒi, one ounce or 480 minims by measure, also 480 grains by weight;
 Oi, one pint; Ci, one gallon.

Imperial to Metric Units

Minims ÷ 16.8941 =	millilitres	Fl. oz. ÷ 35.1960 =	litres
Minims × 0.0592 =	millilitres	Fl. oz. × 0.0284 =	litres
Fl. dr. ÷ 0.2816 =	millilitres	Pints ÷ 1.7598 =	litres
Fl. dr. × 3.5515 =	millilitres	Pints × 0.5682 =	litres
Fl. oz. ÷ 0.0352 =	millilitres	Gallons ÷ 0.2199 =	litres
Fl. oz. × 28.4123 =	millilitres	Gallons × 4.5459 =	litres

FOREIGN WEIGHTS AND MEASURES

Catty (China)	=	1½ lb. av.
Centner (Russia)	=	100.000 lb. av.
Kantar (Turkey)	=	124.4 lb. av. or 44 okes
Kin (Japan)	=	1.3228 lb. av.
Kwan (Japan)	=	8.2673 lb. av.
Livre (Greece)	=	1.1 lb. av.
Maund (British India)	=	82.286 lb. av.
Oke (Greece)	=	2.83 lb. av.
Oke (Turkey)	=	2.83 lb. av.
Pfund (Germany)	=	1.023 lb. av.
Picul (China)	=	133½ lb. av. or 100 catties
Pood (Russia)	=	36.113 lb. av.
Quintal (Greece)	=	123.2 lb. av.
Tael (China)	=	1½ oz.
Tau (China)	=	1.13 gallons
Tical (Siam)	=	233.3 gr.
Yin (China)	=	2½ lb. av.

METRIC WEIGHTS AND MEASURES

MEASURES OF LENGTH

The metric system of weights and measures is a decimal system based upon the metre (m.) which equals 39·370113 inches, and was originally supposed to represent the ten-millionth part of the quadrant of a meridian. The actual standard, at the present time, is the distance determined at 0° between two points on a bar of iridio-platinum, kept in Paris, a copy of which is in the possession of the Board of Trade. The chief subdivisions of the metre are the decimetre (dm.), centimetre (cm.), and millimetre (mm.), being respectively the tenth, hundredth, and thousandth parts of the metre. The thousandth part of a millimetre is termed a micron (μ) and is largely used for minute measurements, while the chief multiple of the metre is the kilometre (km.), a length of one thousand metres, equal to rather more than six-tenths of a mile.

METRIC MEASURES OF LENGTH

1 Micromillimetre (m μ)	=	0·000001 mm.	=	0·00000004	inch	
1 Micron (μ)	.....	=	0·001 mm...	=	0·0000394	inch
1 Millimetre (mm.)	...	=	0·001 m....	=	0·0393701	inch
1 Centimetre (cm.)	...	=	0·010 m....	=	0·3937011	inch
1 Decimetre (dm.)	...	=	0·100 m....	=	3·9370113	inches
1 Metre (m.)	.....	=	1·0 m.....	{	39·370113	inches
					3·280843	feet
					1·0936143	yards
1 Dekametre (dkm.)	..	=	10·0 m...	=	10·93614	yards
1 Hectometre (hm.)	..	=	100·0 m...	=	109·36143	yards
1 Kilometre (km.)	...	=	1,000·0 m...	=	0·62137	mile
1 Myriametre (mym.)		=	10,000·0 m...	=	6·21371	miles

Conversion of Metric to Imperial Units

Millimetres	×	0·0394	=inches	Decimetres	÷	0·2539	=inches
Millimetres	×	25·3999	=inches	Metres	×	39·3701	=inches
Centimetres	×	0·3937	=inches	Metres	÷	0·0254	=inches
Centimetres	÷	2·5399	=inches	Kilometres	×	0·6214	=miles
Decimetres	×	3·9370	=inches	Kilometres	÷	1·6093	=miles

MEASURES OF MASS

The chief metric weight, or measure of mass, is the gramme (g.), which equals 15·4324 grains, and was originally the mass of one-thousandth part of a cubic decimetre of distilled water at 4°, its point of greatest density. The gramme is now more correctly described as the mass of one-thousandth part of a solid cylinder of iridio-platinum 39 millimetres high and the same in diameter, which is kept in Paris, and of

which a copy is in the possession of the Board of Trade. The chief subdivisions of the gramme are the decigram (dg.), centigram (cg.), and milligram (mg.), being respectively the tenth, hundredth, and thousandth part of the gramme. The only multiple of the gramme which is much used is the kilogram (kg.), a weight of one thousand grammes, equal to two and one-fifth pounds.

METRIC WEIGHTS OR MEASURES OF MASS

1 Microgram (μ).....	= 0.001 mg.	= 0.000015 grain
1 Milligram (mg.)....	= 0.001 g.	= 0.015 grain
1 Centigram (cg.)....	= 0.010 g.	= 0.154 grain
1 Decigram (dg.).....	= 0.100 g.	= 1.543 grains
1 Gramme (g.).....	= 1.0 g.	= { 15.4324 grains
		= { 0.7716 scruple
		= { 0.2572 drachm
		= { 0.03215 oz. (Tr.)
		= { 0.03527 oz. (Av.)
1 Dekagram (dkg.)...	10.0 g.	= 0.3527 oz. (Av.)
1 Hectogram (hg.)....	100.0 g.	= 3.5274 oz. (Av.)
1 Kilogram (kg.).....	1000.0 g.	= 2.2046 lb.
1 Myriagram (myg.)..	10.0 kg.	= 22.0462 lb.
1 Quintal (Q.).....	100.0 kg.	= 1.9684 cwt.
1 Millier or Tonne (T.)	1000.0 kg.	= 0.9842 ton.

Conversion of Metric to Imperial Units

Grammes \times 15.4324=grains	Grammes \div 31.1035=oz. (Tr.)
Grammes \div 0.0648=grains	Grammes \times 0.0353=oz. (Av.)
Grammes \div 1.2959=scruples	Grammes \div 28.3495=oz. (Av.)
Grammes \div 3.8879=drachms	Kilogram \times 2.2046=pounds
Grammes \times 0.0322=oz. (Troy)	Kilogram \div 0.4536=pounds

MEASURES OF CAPACITY

The chief metric fluid measure, or measure of capacity, is the litre (l.) which equals 1.7598 pints, and was originally the volume of a cubic decimetre of water at 4°, its point of greatest density. At that temperature the mass of a cubic decimetre of water at normal pressure is 999.972 grammes, and it should be noted that the mass of water in a cubic decimetre is always less than a kilogram, at all temperatures, except under a pressure of four atmospheres, when the mass is exactly 1000 grammes. The present standard litre is the volume of a kilogram mass of distilled water at 4°, and is equal to 1000.809 cubic centimetres at 15°. The chief subdivision of the litre is its one-thousandth part, the millilitre (ml.), which is the volume of a gramme mass of distilled water at 4°, and is equal to 1.000809 cubic centimetres at 15°. The tenth part of a millilitre is termed the decimillilitre and is occasionally used as a measure of capacity for dispensing purposes, while the centimillilitre or hundredth part of a millilitre, though much too small a quantity to be measured, will sometimes be found useful in calculations. It should be noted that half a decimillilitre is equivalent to one standard drop from a pipette made to deliver twenty drops to one gramme of distilled water at 15°.

METRIC MEASURES OF CAPACITY

1 Microl or microlitre (λ)	=	0.001 ml.	=	0.0169 minim
1 Centimil (cml.)	=	0.010 ml.	=	0.1689 minim
1 Decimil (dml.)	=	0.100 ml.	=	1.6894 minims
1 Millilitre or Mil (ml.)	} = 0.001 l. =		{	16.8941 minims
(approx. equal to 1 cubic centimetre, (c.c.))				0.2816 fl. drachm
				0.0352 fl. ounce
				2.8157 fl. drachms
1 Centilitre (cl.)	=	0.010 l.	=	0.35196 fl. ounce
				0.0176 pint
1 Decilitre (dl.)	=	0.100 l.	=	3.5196 fl. ounces
				0.1759 pint
1 Litre (l.)	=	1.0 l.	=	35.1960 fl. ounces
				1.7598 pints
				0.2199 gallon
1 Dekalitre (dkl.)	=	10.0 l.	=	2.19975 gallons
1 Hectolitre (hl.)	=	100.0 l.	=	2.74969 bushels
1 Kilolitre (kl.)	=	1000.0 l.	=	3.43712 quarters

Conversion of Metric to Imperial Units

Millilitres \times 16.8941 = minims	Litres \times 35.1960 = fl. oz.
Millilitres \div 0.0592 = minims	Litres \div 0.0284 = fl. oz.
Millilitres \times 0.2816 = fl. dr.	Litres \times 1.7598 = pints
Millilitres \div 3.5515 = fl. dr.	Litres \div 0.5682 = pints
Millilitres \times 0.0352 = fl. oz.	Litres \times 0.2199 = gallons
Millilitres \div 28.4123 = fl. oz.	Litres \div 4.5459 = gallons

THE WEIGHT OF A LITRE

Two different litres are in use; the standard litre already mentioned, which is the volume of a mass of one kilogram of distilled water at 4°, its temperature of maximum density, and Mohr's litre which, at 15°, contains an amount of distilled water having an apparent weight of one kilogram when weighed in air against brass weights.

In other words, the volume of distilled water contained in a standard litre at 4° has a mass of 1000 grammes and an apparent weight in air against brass weights of 1001.13 grammes and at 15° has a mass of 999.120 grammes, corresponding to an apparent weight in air at that temperature of 1000.199 grammes. The volume of distilled water contained in a Mohr's litre at 15° weighs 1000 grammes in air and measures 1002 ml. or 1000 G.W.A. units. The G.W.A. unit (grammes of water in air) is a substitute for "Mohr's Grammes" or "Mohr's Cubic Centimetres" and the two systems may be converted, the one into the other by the relation shown.

Burettes and other apparatus for volumetric analysis are calibrated on the basis of the standard litre at 20°. Since the capacity of glass vessels varies with change of temperature, any given vessel can only be correct at one particular temperature. The standard temperature now used is 20°. A correct litre flask having a standard temperature, marked on the vessel, of 20°, contains 1 litre of water at 20°, i.e., a quantity of water which at 20° occupies the same volume as that occupied by a mass of one kilogram of water at its temperature of maximum density.

METRIC AND IMPERIAL EQUIVALENTS FOR TRADE PURPOSES

Based on Board of Trade Standards

METRIC TO IMPERIAL

Linear Measure

1 Millimetre (mm.) (1/1000th m.)	=	0.03937 inch
1 Centimetre (1/100th m.)	=	0.3937 inch
1 Decimetre (1/10th m.)	=	3.937 inches
1 Metre (m.)	=	$\left\{ \begin{array}{l} 39.370113 \text{ inches} \\ 3.280843 \text{ feet} \\ 1.0936143 \text{ yards} \end{array} \right.$
1 Dekametre (10 m.)	=	10.936 yards
1 Hectometre (100 m.)	=	109.36 yards
1 Kilometre (1000 m.)	=	0.62137 mile

Square Measure

1 Square centimetre	=	0.15500 square inch
1 Square decimetre (100 square centimetres)	=	15.500 square inches
1 Square metre (100 square decimetres)	=	$\left\{ \begin{array}{l} 10.7639 \text{ square feet} \\ 1.1960 \text{ square yards} \end{array} \right.$
1 Are (100 square metres)	=	119.60 square yards.
1 Hectare (100 ares or 10,000 sq. metres)	=	2.4711 acres

Cubic Measure

1 Cubic centimetre	=	0.0610 cubic inch
1 Cubic decimetre (c.d.) (1000 cubic centimetres)	=	61.024 cubic inches
1 Cubic metre (1000 cubic decimetres)	=	$\left\{ \begin{array}{l} 35.3148 \text{ cubic feet} \\ 1.307954 \text{ cubic yards} \end{array} \right.$

Measure of Capacity

1 Centilitre (1/100th litre)	=	0.070 gill
1 Decilitre (1/10th litre)	=	0.176 pint
1 Litre	=	1.75980 pints
1 Dekalitre (10 litres)	=	2.200 gallons
1 Hectolitre (100 litres)	=	2.75 bushels

Apothecaries' Measure

1 Centimil (1/100th millilitre)	=	0.1689 minim
1 Decimil (1/10th millilitre)	=	1.6894 minims
1 Millilitre or mil (1/1000th litre)	=	$\left\{ \begin{array}{l} 16.8941 \text{ minims, or} \\ 0.2816 \text{ fl. drachm} \\ 2.8157 \text{ fl. drachms, or} \\ 0.35196 \text{ fl. ounce} \end{array} \right.$
1 Centilitre (1/100th litre)	=	0.35196 fl. ounce
1 Decilitre (1/10th litre)	=	3.5196 fl. ounces
1 Litre	=	1.7598 pints

Avoirdupois Weight

1 Milligram (1/1000th g.)	=	0.015 gr.
1 Centigram (1/100th g.)	=	0.154 gr.
1 Decigram (1/10th g.)	=	1.543 gr.
1 Gramme (1 g.)	=	15.432 gr.
1 Dekagram (10 g.)	=	154.32 gr.
1 Hectogram (100 g.)	=	3.527 oz.
1 Kilogram (1000 g.)	=	{ 2.2046223 lb. or 15432.3564 gr.
1 Myriagram (10 kg.)	=	22.046 lb.
1 Quintal (100 kg.)	=	1.968 cwt.
1 Tonne (1000 kg.)	=	0.9842 ton

Troy Weight

1 Gramme (1 g.)	=	{ 0.03215 ounce Troy 15.432 grains
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Apothecaries' Weight

1 Gramme (1 g.)	=	{ 0.2572 drachm 0.7716 scruple 15.432 grains
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IMPERIAL TO METRIC**Linear Measure**

1 Inch	=	25.400 millimetres
1 Foot (12 inches)	=	0.30480 metre
1 Yard (3 feet)	=	0.914399 metre
1 Fathom (6 feet)	=	1.8288 metres
1 Pole (5½ yards)	=	5.0292 metres
1 Chain (22 yards)	=	20.1168 metres
1 Furlong (220 yards)	=	201.168 metres
1 Mile (8 furlongs)	=	1.6093 kilometres

Square Measure

1 Square inch	=	6.4516 sq. centimetres
1 Square foot (144 square inches)	=	9.2903 sq. decimetres
1 Square yard (9 square feet)	=	0.836126 square metre
1 Perch (30½ square yards)	=	25.293 square metres
1 Rood (40 perches)	=	10.117 ares
1 Acre (4840 square yards)	=	0.40468 hectare
1 Square mile (640 acres)	=	259.00 hectares

Cubic Measure

1 Cubic inch	=	16.387 cubic centimetres
1 Cubic foot (1728 cubic inches)	=	0.028317 cubic metre
1 Cubic yard (27 cubic feet)	=	0.764553 cubic metre

Measures of Capacity

1 Gill	=	1.42 decilitres
1 Pint (4 gills)	=	0.568 litre
1 Quart (2 pints)	=	1.136 litres
1 Gallon (4 quarts)	=	4.5459631 litres
1 Peck (2 gallons)	=	9.092 litres
1 Bushel (8 gallons)	=	3.637 dekalitres
1 Quarter (8 bushels)	=	2.909 hectolitres

Apothecaries' Measure

1 Minim	=	{ 5.919 centimillilitres
		{ 0.059 millilitre
1 Fluid scruple	=	1.184 millilitres
1 Fluid drachm (60 minims)	=	3.552 millilitres
1 Fluid ounce (8 drachms)	=	28.4123 millilitres
1 Pint (20 fluid ounces)	=	0.568 litre
1 Gallon (8 pints or 160 fluid ounces)	=	4.5459631 litres

Avoirdupois Weight

1 Grain	=	0.0648 gramme
1 Ounce	=	28.350 grammes
1 Pound (16 oz. or 7000 grains)	=	0.45359243 kilogram
1 Stone (14 lb.)	=	6.350 kilograms
1 Quarter (28 lb.)	=	12.70 kilograms
1 Hundredweight (cwt.) (112 lb.)	=	50.80 kilograms
	=	0.5080 quintal
1 Ton (20 cwt.)	=	1.0160 tonnes or
	=	1016.00 kilograms

Troy Weight

1 Grain	=	0.0648 gramme
1 Pennyweight (24 grains)	=	1.5552 grammes
1 Troy ounce (20 pennyweights)	=	31.1035 grammes

Apothecaries' Weight

1 Grain	=	0.0648 gramme
1 Scruple (20 grains)	=	1.296 grammes
1 Drachm (3 scruples)	=	3.888 grammes
1 Ounce (8 drachms)	=	31.1035 grammes

EQUIVALENTS OF MEASURES OF LENGTH (Metric and Imperial)

Metric	Imperial	Metric	Imperial	Metric	Imperial
Millimetres	Inches	Millimetres	Inches	Millimetres	Inches
1524	60	152	6	25.4	1
1270	50	150	5.91	25	0.98
1016	40	127	5	20	0.79
1000 (1 m.)	39.37	102	4	10 (1 cm.)	0.39
914	36 (1 Yard)	100 (1 dcm.)	3.94	9	0.35
762	30	90	3.54	8	0.31
508	20	80	3.15	7	0.28
305	12 (1 Foot)	76	3	6	0.24
254	10	70	2.76	5	0.20
250	9.84	60	2.36	4	0.16
229	9	51	2	3	0.12
203	8	50	1.97	2	0.08
200	7.87	40	1.57	1	0.04
178	7	30	1.18		

EQUIVALENTS OF WEIGHTS OR MEASURES OF MASS (Metric and Imperial)

Metric Weight	Imperial Weight	Metric Weight	Imperial Weight	Metric Weight	Imperial Weight
Grammes	Grains	Grammes	Grains	Grammes	Grains
1000	15432.4	80	1234.6	7	108.0
907.185	14000 (2 Av. lb.)	70	1080.3	6.480	100
900	13889.1	60	925.9	6	92.6
800	12345.9	50	771.6	5	77.2
700	10802.6	40	617.3	4	61.7
680.388	10500 (24 oz.)	31.1035	480 (1 Apoth. oz.)	3.888	60 (1 drachm)
600	9259.4	30	463.0	3.544	54.6875 (½ Av. oz.)
566.990	8750 (20 oz.)	28.350	437.5 (1 Av. oz.)	3	46.3
500	7716.2	27.215	420 (7 drachms)	2.592	40 (2 scruples)
453.592	7000 (1 Av. lb.)	23.327	360 (6 drachms)	2	30.9
400	6172.9	20	308.6	1.944	30 (½ drachm)
373.544	5760 (1 Troy lb.)	19.439	300 (5 drachms)	1.296	20 (1 scruple)
300	4629.7	15.551	240 (4 drachms)	1	15.4324
226.796	3500 (8 oz.)	14.175	218.75 (½ Av. oz.)	0.648	10 (½ scruple)
200	3086.5	11.663	180 (3 drachms)	0.06479	1 (grain)
170.097	2625 (6 oz.)	10	154.3	0.049	0.76 (½ grain)
141.748	2187.5 (5 oz.)	9	138.9	0.032	0.5 (½ grain)
113.398	1750 (4 oz.)	8	123.5	0.016	0.25 (¼ grain)
100	1543.2	7.775	120 (2 drachms)	0.0080	0.125 (⅛ grain)
90	1388.9				

EQUIVALENTS OF MEASURES OF CAPACITY (Metric and Imperial)

Metric Measure		Imperial Measure		Metric Measure		Imperial Measure	
Millilitres		Minims	Fluid Grains	Millilitres		Minims	Fluid Grains
1000 (1 litre)		16894.1	15398.3	50		844.7	769.9
994.429		16800 (35 fl. oz.)	15312.5	40		675.8	615.9
909.193		15360 (32 fl. oz.)	14000	30		506.8	461.9
900		15204.7	13858.4	28.412		480 (1 fl. oz.)	437.5
852.368		14400 (30 fl. oz.)	13125	24.861		420 (7 fl. dr.)	382.8
800		13515.3	12319	21.309		360 (6 fl. dr.)	328.1
700		11825.8	10478.8	20		337.9	307.9
600		10136.4	9238.9	17.758		300 (5 fl. dr.)	273.4
568.245		9600 (1 pint)	8750	14.206		240 (4 fl. dr.)	218.8
500		8447	7699.1	10.655		180 (3 fl. dr.)	164.1
454.596		7680 (16 fl. oz.)	7000	10		168.9	153.9
400		6757.6	6159.5	9		152	138.5
300		5068.2	4619.5	8		135.2	123.2
284.123		4800 (10 fl. oz.)	4375	7.103		120 (2 fl. dr.)	109.4
227.298		3840 (8 fl. oz.)	3500	7		118.3	107.8
200		3378.8	3079.7	6		101.4	92.4
170.474		2880 (6 fl. oz.)	2625	5		84.5	76.9
142		2400 (5 fl. oz.)	2187.5	4		67.6	61.6
113.649		1920 (4 fl. oz.)	1750	3.552		60 (1 fl. dr.)	54.7
100		1689.4	1539.8	3		50.7	46.2
90		1520.5	1385.1	2		33.8	30.8
85.238		1440 (3 fl. oz.)	1312.5	1.776		30 (½ fl. dr.)	27.3
80		1351.6	1231.86	1		16.9	15.4
70		1182.6	1077.9	0.888		15	13.7
60		1013.6	923.9	0.592		10	9.1
56.825		960 (2 fl. oz.)	875	0.296		5	4.5

MISCELLANEOUS FACTORS

Area of surface of sphere = $4\pi \times$ square of radius.

Volume of sphere = $\frac{4}{3}\pi \times$ cube of radius.

Area of surface of cylinder = $2\pi \times$ radius \times (height + radius).

Volume of cylinder = $\pi \times$ height \times square of radius.

Volume of cone = $\frac{\pi \times \text{height} \times \text{square of radius of base.}}{3}$

Volume of pyramid } = $\frac{\text{Volume of cube on same base and of same height.}}{3}$

One cubic foot of water weighs 1000 oz. = 62.5 lb.

One cubic inch of water weighs 253.2 grains.

One gallon = 0.16 cubic foot or 277.274 cubic inches.

One ton of water measures 224 gallons = 35.9 cubic feet.

One poundal (unit of force) gives in one second a velocity of 1 foot per second to a mass of 1 lb.

One dyne (C.G.S. unit of force) gives in one second a velocity of 1 centimetre per second to a mass of 1 gramme.

One erg (C.G.S. unit of work) is the work done when a force of 1 dyne moves its point of application through 1 cm.

One horse-power = 550 foot-pounds per second.

Mechanical equivalent of heat: heat required to raise 1 lb. of water 1°F. = 779 foot-pounds; heat required to raise 1 gramme of water 1°C. = 424 gramme-metres.

GREEK ALPHABET

Greek letter	Greek name	English equivalent	Greek letter	Greek name	English equivalent
A α	Alpha	a	N ν	Nu	n
B β	Beta	b	Ξ ξ	Xi	x
Γ γ	Gamma	g	Ο ο	Omicron	ō
Δ δ	Delta	d	Π π	Pi	p
E ε	Epsilon	ē	Ρ ρ	Rho	r
Z ζ	Zeta	z	Σ σ	Sigma	s
H η	Eta	ē	Τ τ	Tau	t
Θ θ	Theta	th	Υ υ	Upsilon	u
I ι	Iota	i	Φ φ	Phi	ph
K κ	Kappa	k	Χ χ	Chi	ch
Λ λ	Lambda	l	Ψ ψ	Psi	ps
M μ	Mu	m	Ω ω	Omega	ō

HYDROGEN ION CONCENTRATION

The Determination of pH Values

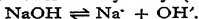
According to the theory of electrolytic dissociation, when hydrogen chloride is dissolved in water it is dissociated into positively charged hydrogen ions and negatively charged chlorine ions,



The acid properties of the solution are due to the hydrogen ions and the strength of the acid is, therefore, dependent upon the extent to which it is ionised, *i.e.*, to the concentration of these hydrogen ions.

In the case of a "weak" acid such as acetic acid the degree of ionisation is comparatively small, a large proportion of the molecules remaining in the undissociated state.

Hence the number of hydrogen ions in equal volumes of solutions of these two acids will differ in each case, although both solutions may be of the same normality and therefore capable of neutralising the same amount of alkali. In fact, it can be shown that hydrochloric acid is sixty times as strong as acetic acid (of the same normality), with respect to its concentration of hydrogen ions. It is important, therefore, to distinguish between the *acidity* of a liquid—determined by its hydrogen ion concentration—and the actual amount of acid present; in other words, its molecular concentration. In the same way the alkalinity of a solution depends upon the concentration of hydroxyl (OH) ions,



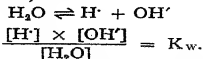
At any given temperature a condition of equilibrium is set up between the ions and the undissociated molecules. According to the *law of mass action*, in any solution, the product of the ion concentrations divided by the concentration of the undissociated molecules is constant. This may be expressed, in the case of a solution of hydrochloric acid, as follows:—

$$\frac{\text{Concn. of hydrogen ions} \times \text{concn. of chlorine ions}}{\text{Concn. of undissociated HCl}} = \text{a constant,}$$

known as the *dissociation constant* of the substance, or symbolically,

$$\frac{[\text{H}^+] \times [\text{Cl}^-]}{[\text{HCl}]} = K_{\text{HCl}}$$

Again, water is ionised, although to an extremely small extent, into hydrogen and hydroxyl ions,



By measuring the electrical conductivity of the purest water obtainable it has been found that at 22° its hydrogen ion concentration is 1/10,000,000, or 10^{-7} g. per litre; that is, one litre of pure water

contains 1/10,000,000 g. of ionised or active hydrogen. It is therefore N/10,000,000.

Since $[H] = [OH']$ it follows that the hydroxyl ion concentration has the same value, *i.e.*, $[OH'] = 10^{-7}$, and a litre of water therefore contains 17/10,000,000 g. of hydroxyl, that is, it is N/10,000,000 with respect to hydroxyl ion. In practice, in order to avoid the use of these inconvenient figures, their logarithms (to the base 10) are employed, and the negative sign is omitted. The term *pH*, as suggested by Sorensen, is applied to these logarithms denoting hydrogen ion concentration. Thus $[H] = 10^{-7}$ becomes *pH* = 7. Therefore *pH* value may be defined as the common logarithm of the reciprocal of the hydrogen ion concentration.

$$pH = \log_{10} \frac{1}{[H]}$$

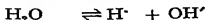
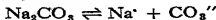
As shown above, *pH* 7 is that of pure water and corresponds to absolute neutrality.

If some hydrochloric acid is added to water the hydrogen ion concentration will be increased, say, to 1/1000 g. per litre or N/1000 ($[H] = 10^{-3}$); the *pH* will decrease to 3. On the other hand the addition of sodium hydroxide will increase the concentration of hydroxyl ions, and in order to maintain the constant the hydrogen ion concentration must decrease, say, to 1/100,000,000 g. per litre (*i.e.*, $[H] = 10^{-8}$), and the solution will be said to have a *pH* = 8. Thus all values of *pH* below 7 indicate acidity, all values above 7, alkalinity. As the hydroxyl ion concentration adjusts itself to any change of the hydrogen ion concentration and *vice versa*, the alkalinity or acidity of a solution is expressed in terms of *pH* only, no reference being made to hydroxyl ion concentration.

Hydrogen Ion Concentration		Hydroxyl Ion Concentration	
[H]		[OH']	
	<i>pH</i>		
N	0	N/10 ¹⁴	
N/10	1	N/10 ¹³	
N/100	2	N/10 ¹²	
N/10,000	4	N/10 ¹⁰	
N/10,000,000	7	N/10 ⁷	
	12	N/10 ²	
	14	N/10 ⁰	

SOLUTIONS OF SALTS.—The solution of a salt, such as potassium chloride, formed by the combination of a strong base with the equivalent quantity of a strong acid, is neutral and its *pH* is 7; the dissociation constants of base and acid are so nearly alike.

Sodium carbonate, however, a neutral salt in the sense that it is formed by the complete replacement of the available hydrogen of the acid by the equivalent of the base, gives a solution having an alkaline reaction; its *pH* is greater than 7.



The hydrogen ions derived from the dissociation of the water combine with the carbonate ions from the sodium carbonate to form the slightly dissociated carbonic acid, while the hydroxyl ions combine with the sodium ions to give the strongly dissociated sodium hydroxide. There is, therefore, a preponderance of *hydroxyl* ions in the solution.

Conversely, the solution of a salt formed by the combination of a weak base with a strong acid will have an acid reaction on account of its greater *hydrogen* ion concentration.

BUFFER ACTION.—If a drop of N/10 hydrochloric acid be added to pure distilled water the hydrogen ion concentration will be increased, and the pH may be reduced from 7 to, say, 3. But if the same quantity of acid be added to a solution containing acetic acid and sodium acetate the change in pH will be very slight. The hydrogen ions of the strong acid combine with the acetyl ions of the sodium acetate to form the slightly dissociated, “weak” acetic acid, and the hydrogen ion concentration is little changed, if at all. The acetate mixture exerts what is known as a “buffer action” and substances which thus regulate the reaction of fluids and prevent sharp changes of pH on dilution or on the addition of small quantities of strong acids or bases are termed “buffers.”

All salts of weak acids and bases, proteins, and amino acids behave in this way to some extent, but the salts of the weak polybasic acids, such as phosphates, borates and citrates, exert the strongest buffer action. Buffers are used in preparing standard solutions of definite pH, such solutions not being greatly affected by gases, *e.g.*, carbon dioxide, absorbed from the atmosphere or by alkali dissolved from vessels. They are also employed to maintain the constancy of the pH of the substrate during the study of the action of enzymes and bacteria.

MEASUREMENT OF HYDROGEN ION CONCENTRATION.—In practice there are available two methods for the determination of the pH values of solutions:—

(1) *Electrometric Method.* This is the more accurate and involves the measurement of the electrical potential of the solution with respect to an electrode, the potential being dependent upon the hydrogen ion concentration. Somewhat elaborate and expensive apparatus is needed, and for most pharmaceutical purposes sufficiently accurate results are obtained by employing the colorimetric method below.

(2) *Colorimetric Method.* In this method the pH value of a solution is determined by adding to it an indicator, a substance of a weak acid or basic nature which exhibits one colour in the undissociated condition and another when ionised. The extent of ionisation is regulated by the hydrogen ion concentration of the solution. Most of the indicators in common use are of the one-colour or two-colour types. Phenolphthalein is an example of the first group, changing as it does from colourless to red or *vice versa*, while methyl red, a two-colour indicator, changes from red to yellow or yellow to red according to the pH of its solution. Between the extremes of colour there is for each indicator a definite zone (equivalent to approximately 2 units of pH), within which there is a gradual transition from one colour to another. Thus, between the limiting values pH 4.2 and pH 6.3, a solution of methyl red changes from a full red colour, through different shades of orange, to full yellow.

Since each indicator has its own characteristic transition interval, it is possible to choose a series of indicators to cover the whole pH range (cf. B.P., Appendix III, p. 523).

UNIVERSAL INDICATORS.—In order to determine approximately the pH of a solution, a mixture of indicators covering a wide range of pH may be used. One drop of the indicator solution is mixed with 10 ml. of the test solution. A different colour is produced for each unit or two units of pH . A more accurate observation may then be made by using the single indicator covering the range signified. Van Urk's Universal Indicator contains 0.1 g. methyl orange, 0.4 g. methyl red, 0.4 g. bromothymol blue, 0.32 g. naphtholphthalein, 0.5 g. phenolphthalein and 1.6 g. cresolphthalein in 100 ml. of 70 per cent. alcohol.

The colours obtained, with their corresponding pH values, are given in the table.

pH Value	Colour
3	Red-orange
5	Yellow-orange
6.5	Yellow
8	Green
9	Green-blue
11	Violet
12	Red-violet

SPOTTING-TILE METHOD.—If a Universal Indicator is not available a rough determination of the pH of a solution may be made by placing drops of different single indicators on to a spotting-tile and then transferring a few drops of the solution to each indicator by means of a pipette or glass rod. This procedure can be extended for the adjustment of the pH of a solution when the colour of the indicator at the particular pH required is known. The acid or alkali is added drop by drop from a burette, and after each addition a little of the well-stirred solution is mixed with the indicator on the tile.

COLOUR STANDARDS.—Having obtained some knowledge of the range within which the pH of a solution lies, an accurate determination (to within 0.1 pH) can be made by employing standard Buffer Solutions (see B.P. Appendix III). Thus, if the colour change is known to take place when using methyl red, buffer solutions between pH 4.4 and 6.2 (and varying successively by about 0.2), are prepared and 10 ml. of each is then transferred to test-tubes of uniform dimensions. The same amount of indicator is added to each and also to a similar quantity of the test solution. The colour obtained in the latter may then be matched against the tints given by the standard solutions. Should the test solution itself be coloured or slightly turbid, it may be diluted, if well buffered. Alternatively, the colouration or turbidity may be neutralised by observing the standard solution through a sample of the test solution containing no indicator.

Reactions of Body Fluids

pH

Gastric Juice	{ Adult.....	0.9-1.6
Perspiration	{ Infants.....	5.0
Urine.....		4.5
Cow's Milk.....		6.0
Saliva.....		6.7
Human Milk.....		6.9
Tears.....		7.1
Blood.....		7.2
Pancreatic Juice.....		7.4
		8.3

Optimum Reactions*

pH

Pepsin.....	1.4
Invertase (Yeast).....	4.5
Protease (Taka-diestase).....	5.1
Trypsin (on Casein).....	6.7
Ptyalin.....	6.7
Maltase (Beer Yeast).....	6.7
Erepsin (Yeast or Intestines).....	7.8
Trypsin (on Fibrin).....	8.0

*The optimum pH value for an enzyme varies with the substrate.

Isoelectric Points

pH

Aspartic Acid.....	2.9
Gelatin.....	4.6
Casein.....	4.6
Serum Albumin.....	4.7
Serum Globulin.....	5.4
Tyrosine.....	5.4
Oxyhaemoglobin.....	6.7
Alanine.....	6.7
Histidine.....	7.2

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HYDROMETERS

British Standard Density Hydrometers

The British Standards Institution has issued a specification (B.S.S. No. 718-1936) for density hydrometers designed to give the density of a liquid at 20° in grammes per millilitre when read in the liquid at that temperature. Three different degrees of openness of scale are provided and hydrometers are available which are adjusted to read accurately in liquids of specified surface tensions varying from 20 to 75 dynes per cm. The specification includes a table from which to obtain corrections to be applied to readings taken in liquids having surface tensions other than that for which the instrument is adjusted. The hydrometers are designed so that the change in reading due to change in surface tension is as small as practicable and the corrections needed when used at temperatures differing considerably from the standard temperature (20°) are so small as to be negligible in most cases.

How to use the Hydrometer. The density of a liquid is usually determined in a cylindrical vessel which should be cleaned before use in order to avoid changes in surface tension due to contamination of the surface of the liquid. The clean hydrometer is held by the top of the stem and inserted into the liquid until approximately in its position of equilibrium; the stem is pushed down so as to immerse it 3-5 mm. beyond the equilibrium position and the hydrometer is allowed to come to rest. The scale reading corresponding to the level surface of the liquid is noted, the scale being viewed through the liquid with the line of sight in the same plane as the level surface of the liquid. If the liquid is opaque, the scale reading is taken where the meniscus merges into the stem of the hydrometer, and a correction added equal to the estimated height of the top of the meniscus above the general level of the surface.

In the case of liquids of high surface tension, surface impurities may produce a considerable lowering of the tension with consequent alteration in the accuracy of the hydrometer reading. A clean surface is readily obtainable by making the determination in an overflow vessel of the type described in the British Standard Specification.

Twaddell's Hydrometer

This hydrometer is extensively used in England. The scale is graduated from 0° to 200°, each degree representing a difference of 0.005 in the specific gravity. The zero of the scale is at the point to which the hydrometer sinks in water at 4°, and represents a specific gravity of 1.000. Conversion of degrees Twaddell to specific gravity is, therefore, according to the following formula:—

$$\text{Specific gravity} = 1 + \frac{5 (^\circ\text{Tw.})}{1000}$$

The Sikes's Hydrometer

The Sikes's Hydrometer was made a legal instrument in 1816, and in 1818 legislative authority was given to Sikes's system. The hydrometer with its accompanying tables (published by H.M. Stationery Office) is used by the officials of the Customs and Excise for ascertaining the alcoholic strength of liquids.

Baumé's Hydrometer

Baumé's hydrometer is commonly used on the Continent and in the United States. The scale is graduated in divisions of equal length and in the original instrument for liquids heavier than water, the zero of the scale was the point to which the hydrometer sank in water at 17.5° and 15° was the point to which it sank in 15 per cent. sodium chloride solution. For liquids lighter than water, the zero was obtained with 10 per cent. sodium chloride, and 10° was obtained with water. Several different methods of construction have, however, been employed, each requiring a different formula for converting the readings to specific gravity; as many as 34 of these formulæ have been recorded. The following tables have been compiled according to the formulæ indicated.

Conversion of Degrees Baumé to Specific Gravity

(a) Liquids denser than water.

$$d = \frac{144.3}{144.3 - n}$$

where d=specific gravity and n=°Bé. Temperature=15°.

° Bé.	0	1	2	3	4	5	6	7	8	9
—	1.000	1.007	1.014	1.021	1.029	1.036	1.043	1.051	1.059	1.066
10	1.074	1.082	1.091	1.099	1.107	1.116	1.125	1.134	1.143	1.152
20	1.161	1.170	1.180	1.190	1.200	1.210	1.220	1.230	1.241	1.251
30	1.262	1.274	1.285	1.296	1.308	1.320	1.332	1.345	1.357	1.370
40	1.384	1.397	1.411	1.424	1.439	1.453	1.468	1.483	1.498	1.514
50	1.530	1.547	1.563	1.580	1.598	1.616	1.634	1.655	1.672	1.692
60	1.712	1.732	1.753	1.775	1.797	1.820	1.843	1.867	1.891	1.916

(b) Liquids less dense than water.

$$d = \frac{146}{136 + n}$$

where d=specific gravity and n=°Bé. Temperature=15°.

° Bé.	0	1	2	3	4	5	6	7	8	9
—10	1.000	0.993	0.986	0.980	0.973	0.967	0.960	0.954	0.948	0.942
—20	0.936	0.930	0.924	0.918	0.913	0.907	0.901	0.896	0.890	0.885
—30	0.880	0.874	0.869	0.864	0.859	0.854	0.849	0.844	0.839	0.834
—40	0.830	0.825	0.820	0.816	0.811	0.807	0.802	0.798	0.794	0.789
—50	0.785	0.781	0.777	0.773	0.768	0.764	0.760	0.757	0.753	0.749

RELATIONSHIP BETWEEN DEGREES TWADDELL,
DEGREES BAUMÉ, AND SPECIFIC GRAVITY.

° Tw.	° Bé.	Sp. Gr.	° Tw.	° Bé.	Sp. Gr.	° Tw.	° Bé.	Sp. Gr.
0	0	1.000	60	33.3	1.300	120	54.1	1.600
1	0.7	1.005	61	33.7	1.305	121	54.4	1.605
2	1.4	1.010	62	34.2	1.310	122	54.7	1.610
3	2.1	1.015	63	34.6	1.315	123	55.0	1.615
4	2.7	1.020	64	35.0	1.320	124	55.2	1.620
5	3.4	1.025	65	35.4	1.325	125	55.5	1.625
6	4.1	1.030	66	35.8	1.330	126	55.8	1.630
7	4.7	1.035	67	36.2	1.335	127	56.0	1.635
8	5.4	1.040	68	36.6	1.340	128	56.3	1.640
9	6.0	1.045	69	37.0	1.345	129	56.6	1.645
10	6.7	1.050	70	37.4	1.350	130	56.9	1.650
11	7.4	1.055	71	37.8	1.355	131	57.1	1.655
12	8.0	1.060	72	38.2	1.360	132	57.4	1.660
13	8.7	1.065	73	38.6	1.365	133	57.7	1.665
14	9.4	1.070	74	39.0	1.370	134	57.9	1.670
15	10.0	1.075	75	39.4	1.375	135	58.2	1.675
16	10.6	1.080	76	39.8	1.380	136	58.4	1.680
17	11.2	1.085	77	40.1	1.385	137	58.7	1.685
18	11.9	1.090	78	40.5	1.390	138	58.9	1.690
19	12.4	1.095	79	40.8	1.395	139	59.2	1.695
20	13.0	1.100	80	41.2	1.400	140	59.5	1.700
21	13.6	1.105	81	41.6	1.405	141	59.7	1.705
22	14.2	1.110	82	42.0	1.410	142	60.0	1.710
23	14.9	1.115	83	42.3	1.415	143	60.2	1.715
24	15.4	1.120	84	42.7	1.420	144	60.4	1.720
25	16.0	1.125	85	43.1	1.425	145	60.6	1.725
26	16.5	1.130	86	43.4	1.430	146	60.9	1.730
27	17.1	1.135	87	43.8	1.435	147	61.1	1.735
28	17.7	1.140	88	44.1	1.440	148	61.4	1.740
29	18.3	1.145	89	44.4	1.445	149	61.6	1.745
30	18.8	1.150	90	44.8	1.450	150	61.8	1.750
31	19.3	1.155	91	45.1	1.455	151	62.1	1.755
32	19.8	1.160	92	45.4	1.460	152	62.3	1.760
33	20.3	1.165	93	45.8	1.465	153	62.5	1.765
34	20.9	1.170	94	46.1	1.470	154	62.8	1.770
35	21.4	1.175	95	46.4	1.475	155	63.0	1.775
36	22.0	1.180	96	46.8	1.480	156	63.2	1.780
37	22.5	1.185	97	47.1	1.485	157	63.5	1.785
38	23.0	1.190	98	47.4	1.490	158	63.7	1.790
39	23.5	1.195	99	47.8	1.495	159	64.0	1.795
40	24.0	1.200	100	48.1	1.500	160	64.2	1.800
41	24.5	1.205	101	48.4	1.505	161	64.4	1.805
42	25.0	1.210	102	48.7	1.510	162	64.6	1.810
43	25.5	1.215	103	49.0	1.515	163	64.8	1.815
44	26.0	1.220	104	49.4	1.520	164	65.0	1.820
45	26.4	1.225	105	49.7	1.525	165	65.2	1.825
46	26.9	1.230	106	50.0	1.530	166	65.5	1.830
47	27.4	1.235	107	50.3	1.535	167	65.7	1.835
48	27.9	1.240	108	50.6	1.540	168	65.9	1.840
49	28.4	1.245	109	50.9	1.545	169	66.1	1.845
50	28.8	1.250	110	51.2	1.550	170	66.3	1.850
51	29.3	1.255	111	51.5	1.555	171	66.5	1.855
52	29.7	1.260	112	51.8	1.560	172	66.7	1.860
53	30.2	1.265	113	52.1	1.565	173	67.0	1.865
54	30.6	1.270	114	52.4	1.570	174	67.1	1.870
55	31.1	1.275	115	52.7	1.575	175	67.3	1.875
56	31.5	1.280	116	53.0	1.580	176	67.5	1.880
57	32.0	1.285	117	53.3	1.585	177	67.7	1.885
58	32.4	1.290	118	53.6	1.590	178	68.0	1.890
59	32.8	1.295	119	53.9	1.595	179	68.2	1.895

ALCOHOL USED IN MEDICINAL PREPARATIONS

The conditions under which alcohol may be obtained, used and sold are controlled through H.M. Customs and Excise. Two classes of spirit are recognised, Mature Spirit and Immature Spirit. The former is spirit which has been stored for at least three years in bond. Immature spirit is that which has not been so stored, and which is used for the preparation of medicinal and other products. The full duty is payable on the spirit at the time of purchase. For the purposes of Customs and Excise the quantity of spirit is always expressed in terms of proof gallons regardless of its actual volume, hence it follows that the figure for the number of proof gallons is no direct indication of the volume of the spirit. For example 1 gallon of 90 % v/v alcohol is equivalent to 1.578 proof gallons, while 1 gallon of 10 % v/v alcohol is equivalent to 0.174 proof gallons. When spirit on which the full duty has been paid is used in the preparation of medicinal products, the Customs and Excise will, under suitable conditions, allow a rebate. In order to claim the rebate the manufacturer must comply with the official regulations, keeping a record of spirit purchased, how used, quantity of preparations produced, etc., in a register which must be open to inspection and balance by the Officers of the Customs and Excise. The claims for rebate are made to the local office of the Customs and Excise on a special form, obtainable from them, and may be made once in every two weeks, but must not extend over a period longer than three months. Rebate is allowed on preparations which are regarded as medicinal, but not on such as are purely flavouring or colouring agents. Thus rebate is allowed on preparations of the B.P. and B.P.C. such as Liq. Quinin. Ammon. B.P. or Tinct. Myrrhæ et Boracis B.P.C., but not on Tinct. Limonis B.P., or Tinct. Cocci B.P. Further special permits are granted for rebate to be drawn on formulæ provided that they are submitted to and approved by the Customs and Excise, and the conditions of manufacture complied with. The rebate claimed should be on the actual quantity of alcohol used in the manufacture of the preparation. For export purposes a drawback is allowed by the Customs and Excise equal to the amount of duty which has been paid on the spirit which is actually contained in the quantity of preparations exported. Claims for drawback must be made on official forms, and the various conditions imposed by the Customs and Excise must be complied with. Those desirous of taking advantage of the allowances should communicate with their local Officer of Customs and Excise, who will advise them of the conditions required. Under certain special conditions Immature Spirit can be obtained duty free. One of the chief regulations governing its use is that it must be denatured with 2 per cent. of pure Methyl Alcohol in the presence of the Officer of Customs and Excise in the place where it is to be used.

Methylated Spirits

Four varieties of methylated spirits are recognised, Mineralised Methylated Spirits, Industrial Methylated Spirits, Industrial Methylated Spirits (pyridinised) and Power Methylated Spirits. The first two are of importance to the pharmacist. Mineralised Methylated Spirits consists of alcohol with the addition of 9.5% by volume of wood naphtha, 0.5% by volume of pyridine and $\frac{3}{4}$ % of mineral naphtha, the mixture being coloured by the addition of an aniline dye. Industrial Methylated Spirits consists of alcohol with 5% by volume of wood naphtha. Its use is permitted in the preparation of a number of B.P. and B.P.C. formulæ, in the articles specified in the N.P.U. Formulary, and in special formulæ which have been submitted for approval and accepted by the Customs and Excise authorities. For the conditions governing the use and sale of this spirit the pharmacist is referred to Statutory Rules and Orders, 1930, No. 832, and to the "Extracts from the Regulations" published in the N.P.U. Formulary.

Proof Spirit

The Spirits Act, 1815, defined proof spirit as that which at 51°F. weighed exactly 12/13 of an equal volume of distilled water. The temperature at which the water was to be measured was not stated but 51°F. is generally understood. Proof spirit contains 49.28 per cent. w/w or, at 60°F., 57.10 per cent. v/v of ethyl alcohol and has a sp. gr. of 0.91976. The strength of alcohol is frequently stated in terms of proof spirit. Spirit of such a strength that 100 volumes contain as much alcohol as 160 volumes of proof spirit is described as "60 O.P." (over proof). Spirit of which 100 volumes contain as much alcohol as 40 volumes of proof spirit is described as "60 U.P." (under proof). Alcohol (90 per cent.) is 58 O.P. Each gallon of alcohol (90 per cent.) is equivalent to 1.5779 gallons of proof spirit.

THE DILUTION OF ALCOHOL

The following simple method may be used to prepare alcohol of any required strength from a stronger alcohol. Owing to the rise in temperature and the contraction in volume that occur when alcohol is diluted with water, it is essential for the dilution to be allowed to cool to 15.5° before the final adjustment of volume is made.

Using alcohol (90 per cent.) 60, 40, or 20 per cent. alcohols may be prepared by diluting 60, 40 or 20 volumes of the alcohol (90 per cent.) to 90 volumes by addition of water, cooling to 15.5° and then adjusting the volume at that temperature. Similarly, using 80 per cent. alcohol to make the same dilutions, 60, 40 or 20 volumes of the 80 per cent. alcohol are diluted to 80 volumes and the volume adjusted as described.

A second method of diluting alcohol is described in Appendix III of the B.P.C. 1934, in which tables are provided for converting specific gravity readings at various temperatures into percentage strengths by volume. The necessity for cooling may also be avoided by means of the following table. For example, to produce alcohol 55 per cent. v/v from alcohol 75 per cent., to 100 volumes of the latter add 38.29 volumes of water. The volume of the product will be rather less than 138.29 volumes owing to the contraction which occurs on diluting.

TABLE OF ALCOHOLIC STRENGTH OF THE
B.P. PREPARATIONS

(incorporating corrigenda contained in the B.P. Addenda)

B.P. Preparations	Percentage of Ethyl Alcohol v/v B.P. limits.	Equivalent strength in per cent. Proof Spirit.
Aqua Anethi Concentrata	52-56	91.0- 98.1
Aqua Cinnamomi Concentrata	52-56	91.0- 98.1
Aqua Menthae Piperitæ Concentrata	52-56	91.0- 98.1
Collodium Flexile	20-23	34.9- 40.2
Extractum Belladonnæ Liquidum	48-66	84.0-115.6
Extractum Cascaræ Sagradæ Liquidum	21-24	36.6- 41.9
Extractum Cinchonæ Liquidum	21-24	36.6- 41.9
Extractum Colchici Liquidum	50-60	87.5-105.1
Extractum Ergotæ Liquidum	not less than 40	not less than 70.0
Extractum Glycyrrhizæ Liquidum	16-20	27.9- 34.9
Extractum Hamamelidis Liquidum	32-40	55.9- 70.0
Extractum Hyoscyami Liquidum	50-60	87.5-105.1
Extractum Ipecacuanhæ Liquidum	75-80	131.4-140.2
Extractum Nucis Vomicae Liquidum	36-42	62.9- 73.5
Extractum Senegæ Liquidum	38-44	66.6- 77.0
Extractum Sennæ Liquidum	21-24	36.6- 41.9
Extractum Stramonii Liquidum	28-40	49.1- 70.0
Infusum Aurantii Concentratum	22-25	38.4- 43.7
Infusum Buchu Concentratum	21-25	36.6- 43.7
Infusum Calumbæ Concentratum	21-24	36.6- 41.9
Infusum Caryophylli Concentratum	23-25	40.2- 43.7
Infusum Gentianæ Compositum Concentratum	20-24	34.9- 41.9
Infusum Quassiae Concentratum	21-24	36.6- 41.9
Infusum Senegæ Concentratum	20-24	34.9- 41.9
Infusum Sennæ Concentratum	20-24	34.9- 41.9
Linimentum Aconiti	75-85	131.4-149.0
Linimentum Belladonnæ	60-70	105.1-122.6
Linimentum Camphoræ Ammoniatum	54-58	94.5-101.6
Linimentum Saponis	61-65	106.8-113.8
Liquor Glycerylis Trinitratis	88-90	154.2-157.7
Liquor Iodi Fortis	76-79	133.2-138.5
Liquor Iodi Mitis	85-88	149.0-154.2
Liquor Iodi Simplex	92-94	161.3-164.8
Liquor Morphinae Hydrochloridi	21-24	36.6- 41.9
Liquor Picis Carbonis	75-85	131.4-149.0
Liquor Quininae Ammoniatæ	52-54	91.0- 94.5
Liquor Strychninae Hydrochloridi	21-24	36.6- 41.9
Spiritus Ætheris	59-65	103.4-113.8

TABLE OF ALCOHOLIC STRENGTH OF THE
B.P. PREPARATIONS—*continued.*

B.P. Preparations	Percentage of Ethyl Alcohol v/v B.P. limits.	Equivalent strength in per cent. Proof Spirit.
Spiritus Ætheris Nitrosi	84-88	147.2-154.2
Spiritus Ammoniae Aromaticus	65-70	113.8-122.6
Spiritus Cajuputi	80-82	140.2-143.7
Spiritus Camphoræ	80-82	140.2-143.7
Spiritus Chloroformi	84-87	147.2-152.5
Spiritus Menthæ Piperitæ	80-82	140.2-143.7
Tinctura Asafoetidæ	60-65	105.1-113.8
Tinctura Aurantii	73-78	127.9-136.7
Tinctura Belladonnæ	64-69	112.1-120.9
Tinctura Benzoini Composita	70-77	122.6-134.9
Tinctura Calumbæ	57-60	99.8-105.1
Tinctura Capsici	57-60	99.8-105.1
Tinctura Cardamomi Composita	52-57	91.0- 99.8
Tinctura Catechu	37-40	64.7- 70.0
Tinctura Cinchonæ	64-66	112.1-115.6
Tinctura Cinchonæ Composita	63-67	110.4-117.4
Tinctura Cocci	42-45	73.5- 78.7
Tinctura Colchici	58-60	101.6-105.1
Tinctura Digitalis	65-70	113.8-122.6
Tinctura Gentianæ Composita	41-45	71.7- 78.7
Tinctura Hyoscyami	66-71	115.6-124.4
Tinctura Ipecacuanhæ	20-24	34.9- 41.9
Tinctura Kramerizæ	55-59	96.3-103.4
Tinctura Limonis	48-54	84.0- 94.5
Tinctura Lobeliæ Ætherea	55-63	96.3-110.4
Tinctura Myrrhæ	82-87	143.7-152.5
Tinctura Nucis Vomicae	47-50	82.2- 87.5
Tinctura Opii	41-46	71.7- 80.5
Tinctura Opii Camphorata	56-60	98.1-105.1
Tinctura Quassizæ	43-45	75.2- 78.7
Tinctura Quillaizæ	43-45	75.2- 78.7
Tinctura Rhei Composita	48-53	84.0- 92.8
Tinctura Scillæ	52-57	91.0- 99.8
Tinctura Senegæ	57-60	99.8-105.1
Tinctura Stramonii	40-45	70.0- 78.7
Tinctura Strophanthi	67-70	117.3-122.6
Tinctura Tolutana	80-84	140.2-147.2
Tinctura Valerianæ Ammoniata	50-54	87.5- 94.5
Tinctura Zingiberis Fortis	82-88	143.7-154.2
Tinctura Zingiberis Mitis	88-90	154.2-157.7

TABLE OF SOLUBILITIES

The solubility is stated as the number of millilitres of the solvent in which the given number of grammes of a solid or millilitres of a liquid will remain in solution at a temperature of 15-5° unless otherwise stated.

SUBSTANCE	SOLUBILITY IN					
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin	Fixed Oils and Liquid Paraffin
Acids	Almost entirely 1 in 1	Insoluble	—	—	—	—
Acetomenaphthone	Almost insoluble	Slightly soluble in cold 95% 1 in 3-3 boiling (95%)	—	—	—	—
Acetone	Miscible	Miscible	Miscible	Miscible	—	—
Acidum Acetylsalicylicum	1 in 300	1 in 5	1 in 20	1 in 17	—	—
Acidum Ascorbicum	Readily soluble	Soluble (95%)	Insoluble	1 in 7	—	—
Acidum Benzoicum	1 in 450	1 in 3	1 in 2-5	—	About 1 in 30	Soluble
Acidum Boricum	1 in 25	1 in 30	—	Soluble	1 in 4	Soluble
Acidum Citricum	Insoluble	Soluble boiling (95%)	Soluble	—	—	—
Acidum Citricum	5 in 3	1 in 1-5	1 in 40	Almost insoluble	1 in 2	—
Acidum Lacticum	Miscible	Miscible	Miscible	Almost insoluble	—	—
Acidum Mandelicum	1 in 7	1 in 1 (95%)	—	—	—	—
Acidum Nicotinicum	1 in 75	Readily soluble boiling (95%)	Almost insoluble	—	—	—
Acidum Oleicum	Insoluble	Readily	Readily	Readily	—	Miscible
Acidum Ricinoleicum	Insoluble	Soluble (95%)	Soluble	Soluble	—	—
Acidum Salicylicum	1 in 500	1 in 3-5	1 in 2	1 in 55	—	—
Acidum Tannicum	1 in 1	1 in 1	Almost insoluble	Almost insoluble	1 in 1 slowly 1 in 4-5	—
Acidum Tartaricum	1 in less than 1	1 in 2-5	1 in 195	Almost insoluble	—	—
Acidum Trichloroaceticum	9 in 1	Very soluble	Very soluble	Almost insoluble	—	Insoluble
Acridiflavina	1 in 3	Soluble	Almost insoluble	Almost insoluble	—	Soluble
Adeps	Insoluble	Very slightly soluble	1 in 22	Readily	—	—
Adeps Lame	Insoluble	Sparkingly soluble	Readily	Readily	—	Soluble

TABLE OF SOLUBILITIES—(continued)

SUBSTANCE	SOLUBILITY IN					
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin	Fixed Oils and Liquid Paraffin
Adrenalina	Springily soluble	Insoluble	Insoluble	Insoluble	—	—
Ether	1 in 8.5	Miscible	1 in 0.05	Miscible	—	—
Ethylennum	1 in 9.2	2 in 1	Miscible	—	—	—
Ethylis Chloridum	Slightly soluble	Miscible	Miscible	Miscible	—	—
Alcohol (Dehydratum)	Miscible	—	—	—	—	—
Alcohol (Tritumetum)	1 in 33	—	—	—	—	—
Alcoholia Lene	Insoluble	Moderately soluble	Freely soluble	Freely soluble	—	—
Albium	Almost entirely	1 in 18	Very sparingly soluble	Very sparingly soluble	—	—
Alumen	1 in 130	Insoluble	—	—	Freely soluble	—
Alumen	Very soluble	1 in 2	Readily	Readily	—	—
Amidopyrina	1 in 18	Insoluble	—	—	1 in 5	—
Ammonii Bicarbonas	1 in 5.5	1 in 200	—	—	1 in 8 at 25°	—
Ammonii Carbonas	1 in 4	1 in 60	—	—	(U.S.P.)	—
Ammonii Chloridum	1 in 3	—	—	—	—	—
Amphetamina	Slightly soluble	Soluble in 95%	Soluble	—	—	—
Amphetamina Sulphas	Readily soluble	Slightly soluble	Insoluble	—	—	—
Amyleni Hydras	1 in 8	Miscible	Miscible	Miscible	Miscible	—
Anisii Nitras	Insoluble	Miscible	Soluble	Soluble	—	—
Anisocaine Hydrochloridum	1 in 2	1 in 3 (dehydrated)	—	—	—	—
Aneurinas Hydrochloridum	Readily	—	Insoluble	—	—	—
Antimoni et Potassii Tartras	1 in 17	Insoluble	—	—	1 in 20	—
Antimoni et Sodii Tartras	1 in 1.5	1 in 50	Springily soluble	Springily soluble	1 in 100	—
Apomorphinas Hydrochloridum	1 in 50	—	Slightly soluble	—	Slightly soluble	—
Argemii Nitras	2 in 1	1 in 25	—	—	—	—
Argentii Nitras Induratus	Freely soluble	Springily soluble	—	—	—	—
Argentoproteinum	Slowly soluble	Almost insoluble	Almost insoluble	Almost insoluble	—	—
Arseni Triiodidum	1 in 2	Almost insoluble (95%)	Soluble	Soluble	—	—
Arseni Triiodidum	1 in 18	1 in 12	—	—	—	—

TABLE OF SOLUBILITIES

	1 in 65 slowly depending on the relative proportion of vitreous and opaque varieties present and on the degree of subdivision	1 in 500	Slightly soluble (U.S.P.)	1 in 8	1 in 50 to 100 (vegetable oils)
Arseni Thioridum.....	1 in 65 slowly depending on the relative proportion of vitreous and opaque varieties present and on the degree of subdivision	1 in 500	1 in 16	1 in 8	—
Atropina	1 in 500	1 in 3	1 in 420 at 25°	1 in 52	—
Atropinae Sulphas	2 in 1	1 in 4	1 in 3,000 at 25°	1 in 2.5 at 25° (U.S.P.)	—
Balsamum Peruvianum.....	Insoluble	1 in 1 becoming turbid on further addition of 2 or more volumes of alcohol	Partially	Soluble	—
Balsamum Tolutanum.....	Nearly insoluble	1 in 170	—	—	—
Barbitonum.....	1 in 6	1 in 8.5	Soluble	2 in 1	—
Barbitonum Solubile.....	Insoluble	1 in 8	Soluble	Soluble	—
Bari Sulphas	1 in 2,500	1 in 8	Insoluble	Insoluble	—
Benzocaina	Insoluble	1 in 2	1 in 4	1 in 2	1 in 50
Benzylia Benzoes	Insoluble	1 in 1,000	Soluble	1 in 17	Soluble
Betanaphthol	Insoluble	1 in 2	Soluble	—	—
Bismuthi Carbonas	Insoluble	—	Soluble	—	—
Bismuthi Oxichloridum.....	Insoluble	—	—	—	—
Bismuthi Salicylas	Insoluble	—	—	—	—
Bismuthi et Sodii Tartras	More than 1 in 1	—	Insoluble	—	—
Bismuthi Subgalles	Insoluble	Insoluble	Insoluble	—	—
Bismuthum Precipitatum.....	Insoluble	Insoluble	—	—	—
Borax.....	1 in 25	Insoluble	—	1 in 1	—
Caffeina.....	1 in 80	1 in 40	1 in 400	1 in 7	—
Caffeina et Sodii Benzoes.....	1 in 4 (cold)	1 in 30 (95%) at 25° (U.S.P.)	—	Soluble	—
Calciferol.....	1 in 1 (warm)	Readily soluble (95%)	Readily Soluble	Readily soluble	1 in 50 to 100 (vegetable oils)
Calcii Carbonas	Insoluble	Insoluble	—	—	—
Calcii Chloridum	1 in 1.5	Insoluble	—	—	—
Calcii Gluconas	Slowly soluble	Insoluble in 1 in 3	Insoluble	Insoluble	—
	1 in 30 at 25° dehydrated	alcohol	—	—	—
	1 in 5 of boiling	alcohol	—	—	—

WHEELER

TABLE OF SOLUBILITIES—(continued)

SUBSTANCE	SOLUBILITY IN					Fixed Oils and Liquid Paraffin
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin	
Calcii Hydroxidum.....	1 in 900	—	—	—	Slightly soluble	—
Calcii Lactas	1 in 18.5	Slightly soluble	Insoluble	—	—	—
Calcii Phosphas.....	Almost insoluble	—	—	—	—	—
Calcii Chlorinat.....	Partially soluble	Partially	—	—	—	—
Campora	1 in 700	1 in 1,100	12 in 7	4 in 1	—	Freely soluble
Cantharidum.....	Sparingly soluble	—	1 in 700	1 in 55	—	—
Carbæcholum	Very soluble	—	Almost insoluble	—	—	—
Carbonæ Dioxidum.....	1 in 1.8 at 25°	—	—	—	—	—
Carbonæ Tetrachloridum.....	1 in 2,000 at 25° (U.S.P.)	Miscible (95%)	Miscible	Miscible	—	Miscible
Carbomaltum.....	1 in 3,000	1 in 18	1 in 14	1 in 3	—	—
Cera.....	Insoluble	Sparingly soluble	Soluble	Soluble	—	Soluble
Chinifonium	Soluble 1 in 25 with effervescence	Insoluble in 95%	Insoluble	Insoluble	—	—
Chloralis Hydras.....	4 in 1	5 in 1	2 in 1	1 in 3	2 in 1	Very soluble in olive oil
Chloramina.....	1 in 7	1 in 12	Insoluble	Insoluble	—	—
Chlorbutol.....	1 in 125	1 in 1	Readily	Readily	1 in 10	—
Chlorocresol.....	1 in 250	Readily soluble	Readily soluble	—	—	Readily soluble
Chloroformum	1 in 200	Miscible with dehydrated alcohol	Miscible	—	—	Miscible
Chloroxylenol	1 in 3000 (cold); 1 in 200 (boiling)	Soluble (95%)	Soluble	—	—	Soluble in fixed oils
Chromii Trioxidum.....	2 in 1	—	Very soluble	—	—	—
Chrysarobinum	Almost insoluble	1 in 400 (95%) at 25° (U.S.P.)	1 in 160 at 25° (U.S.P.)	1 in 15 at 25° (U.S.P.)	—	—
Cinchophenium.....	Insoluble	1 in 120	1 in 100	1 in 400	—	1 in 24 in olive oil; 1 in 120 in liquid paraffin
Cocaina	1 in 1,300	1 in 10	1 in 4	2 in 1	Insoluble	—

TABLE OF SOLUBILITIES—(continued)

SUBSTANCE	SOLUBILITY IN				
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin
Gelatinum	Forms a gel	Insoluble	Insoluble	Insoluble	Insoluble
Glucosum Liquidum	Miscible	Partially miscible	Insoluble	Insoluble	—
Glycerinum	Miscible	Miscible	Miscible	Miscible	Insoluble
Gustacol	1 in 80	—	—	—	1 in 1 at 25°
Hexanina	1 in 1-5	1 in 8	Almost insoluble	Soluble	—
Hexobarbitonum	1 in 3000	Soluble	Slightly soluble	Slightly soluble	—
Hexobarbitonum Solubile	Very soluble	—	—	—	—
Histanine; Phosphas Acidus	1 in 4-5	Slightly soluble	—	—	—
Homatropinas Hydrobromidum	1 in 6	1 in 18	Insoluble	1 in 420 at 25° (U.S.P.)	—
Hydrargyri Iodidum Rubrum	Almost insoluble	1 in 300	1 in 150	1 in 910 at 25° (U.S.P. X)	1 in 50 in castor oil, 1 in 230 in olive oil
Hydrargyri Oxidum, Flavum	Insoluble	Insoluble	—	—	—
Hydrargyri Oxycyanidum	1 in 18	1 in 4	1 in 4	0-106 in 100 w/w at 20°	—
Hydrargyri Perchloridum	1 in 18	—	—	—	1 in 2 slowly
Hydrargyri Subchloridum	Insoluble	Insoluble	Insoluble	—	—
Hydrargyrum Ammoniatum	Insoluble	Insoluble	Insoluble	—	—
Hyoscine Hydrobromidum	About 1 in 2	1 in 13	Almost insoluble	Almost insoluble	—
Ichthammol	Soluble	Partially	Partially	—	Miscible
Indicaminum	1 in 100	Almost insoluble	—	1 in 10	—
Iodofornum	Very slightly soluble	1 in 100	1 in 8	—	About 1 in 100
Iodophthalinum	1 in 7	Slightly soluble	—	—	1 in 30 in olive oil
Iodoxylinum	1 in 1-2	1 in 100	Insoluble	Insoluble	—
Iodum	1 in 2350	1 in 12	1 in 4	1 in 30	—
at 25° (U.S.P.)					1 in 65
Lactosum	1 in 7	Almost insoluble	Insoluble	Insoluble	—
Lervulosum	Very soluble	Soluble	—	—	—
Leptazolium	Readily soluble	Readily soluble (95%)	Readily soluble	Readily soluble	—

TABLE OF SOLUBILITIES

175

Liquor Vitamini A Concentratus	—	Slightly soluble	Miscible	Miscible	—	Miscible
Liquor Vitamini A et D Concentratus	—	Slightly soluble	Miscible	Miscible	—	Miscible
Liquor Vitamini D Concentratus	—	Slightly soluble	Miscible	Miscible	—	Miscible
Magnesi Carbonas Levis	Almost insoluble	Insoluble	—	—	—	—
Magnesi Carbonas Ponderosus	Almost insoluble	Insoluble	—	—	—	—
Magnesi Oxidum Leve	Almost insoluble	Insoluble	—	—	—	—
Magnesi Oxidum Ponderosum	Almost insoluble	Insoluble	—	—	1 in 1 at 25° (U.S.P.)	—
Magnesi Sulphas	1 in 1.5	Sparingly soluble	—	—	—	—
Magnesi Trilicase	Insoluble	—	—	—	—	—
Menaphtholum	Insoluble	Slightly soluble in 95% alcohol	—	—	—	—
Menthol	Almost insoluble	5 in 1	8 in 3	About 4 in 1	Almost insoluble	About 1 in 50 of fixed oils Soluble in oils 1 in 6 in liquid paraffin
Mepacrine Hydrochloridum	1 in 30 1 in 3 1 in 1	—	—	—	—	—
Mepacrine Methanosulphonas	1 in 1	1 in 36 (95%) 1 in 3 (95%)	Insoluble	Insoluble	—	—
Mesalyium	Insoluble	Moderately soluble in alcohol	Soluble	Soluble	—	—
Mesulphenum	—	dehydrated	—	—	—	—
Methylia Hydroxybenzeas	1 in 400 1 in 20 (boiling)	1 in 2.5 (95%) 1 in 5 (70%) 1 in 16 (50%) 1 in 140 (20%)	Readily soluble	—	1 in 60 warm	1 in 40 of warm vegetable oils
Methylia Salsylas	Slightly soluble	Miscible	Miscible	Miscible	—	Miscible
Methylsalphenal	1 in 320	1 in 12	Soluble	Soluble	—	—
Methylionias Chloridum	Soluble	Soluble	—	—	—	—
Morphine Chloridum	1 in 25	1 in 50	Insoluble	Insoluble	1 in 8	—
Morphine Hydrochloridum	1 in 15.5	1 in 565 (95%)	Insoluble	Insoluble	—	—
Morphine Sulphas	1 in 11	Sparingly soluble	Insoluble	Insoluble	—	—
Morphine Tannas	—	—	—	—	—	—
Neonaphrenamina	Soluble	Insoluble in dehydrated	Insoluble	Almost insoluble	Soluble	—
Nicotinamidum	1 in 1	1 in 1.5 (95%)	Slightly soluble	—	1 in 10 at 25°	—
Nikethamidum	Miscible	Readily soluble	—	—	—	—
Nitrogeni Monoxidum	1 in 2 (15°-25°)	—	—	—	—	—

TABLE OF SOLUBILITIES—(continued)

SUBSTANCE	SOLUBILITY IN					
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin	Fixed Oils and Liquid Paraffin
Cetastrols Benzosis	—	Soluble in 85%	—	—	—	Soluble in vegetable oils
Cetastrom	Almost insoluble	About 1 in 400 (95%)	—	—	—	About 1 in 800 (olive oil and aracus oil)
Oleum Abietis	—	1 in 1	—	—	—	—
Oleum Amygdale	—	Slightly soluble	—	—	—	—
Oleum Amygdale Volatile Purificatum	—	1 in 2 (70%)	1 in 2-25	Miscible	—	—
Oleum Anethi	—	1 in 1	Readily	—	—	—
Oleum Anisi	—	1 in 3	—	—	—	—
Oleum Arachis	—	Slightly soluble	Miscible	Miscible	—	—
Oleum Cadinum	Very slightly soluble	Partially	1 in 3	Soluble	—	—
Oleum Calupui	—	1 in 2 (80%)	—	—	—	—
Oleum Carli	—	1 in 1	—	—	—	—
Oleum Carophylli	—	1 in 2 (70%)	Soluble	—	—	—
Oleum Chenopodii	—	1 in 3-10 (70%)	—	—	—	—
Oleum Cinnamomi	—	1 in 3 (70%)	—	—	—	—
Oleum Coriandri	—	1 in 3 (70%)	—	—	—	—
Oleum Eucalypti	—	1 in 5 (70%)	—	—	—	—
Oleum Gossypii Seminis	—	Slightly soluble	Miscible	Miscible	—	—
Oleum Hippocrosti	—	Slightly soluble	Miscible	Miscible	—	—
Oleum Hydnocarp	—	Partially	Miscible	Miscible	—	—
Oleum Hydnocarp Ethylicum	—	1 in 6	Miscible	Miscible	—	Miscible
Oleum Lavandule	—	1 in 4 (70%)	—	—	—	—
Oleum Limonis	—	1 in 12	Miscible	Miscible	—	—
Oleum Lini	—	Slightly soluble	Miscible	Miscible	—	—
Oleum Menthe Piperite	—	1 in 4 (70%)	—	—	—	—
Oleum Morrhuæ	—	Slightly soluble	—	—	—	—
Oleum Myristice	—	1 in 3	Miscible	Miscible	—	—
Oleum Olive	—	Slightly soluble	Miscible	Miscible	—	—
Oleum Ricini	—	1 in 3-5	Soluble	—	—	—
Oleum Rosmarini	—	1 in 1	—	—	—	—
Oleum Santali	—	1 in 5 (70%) at 20°	—	—	—	—

<i>Oleum Santali Australiensis</i> . . .	—	1 in 3-6 (70%) at 20°	—	—	—	—	—
<i>Oleum Sesami</i>	—	Slightly soluble	Miscible	Miscible	—	—	—
<i>Oleum Terebinthine</i>	—	1 in 7	Soluble	Soluble	—	—	—
<i>Oleum Theobromatis</i>	—	Slightly soluble	Freely soluble	Freely soluble	—	—	Miscible
<i>Oleum Vitaminatum</i>	—	Slightly soluble	Miscible	Miscible	—	—	—
<i>Orthocana</i>	Springy soluble	1 in 7	1 in 50	—	—	—	—
<i>Oxygenium</i>	1 in 43	1 in 3-6 (95%)	—	—	—	—	—
<i>Pamaquinum</i>	Insoluble	—	—	—	—	—	—
<i>Pancratium</i>	Slowly soluble	Insoluble	Insoluble	Soluble	—	—	Soluble warm
<i>Papaverum Durum</i>	Insoluble	Insoluble	Soluble	Soluble	—	—	Miscible with oils
<i>Papaverum Liquidum</i>	Insoluble	Insoluble	Soluble	Soluble	—	—	Miscible
<i>Papaverum Liquidum Leve</i>	Insoluble	Insoluble	Soluble	Soluble	—	—	Soluble warm
<i>Paraldehydum</i>	1 in 9	Miscible	Miscible	Miscible	—	—	—
<i>Pelletierine Tannus</i>	About 1 in 700	1 in 80	Slightly soluble	Insoluble	—	—	—
<i>Pepsinum</i>	Almost entirely 1 in 50	Insoluble	Insoluble	Insoluble	—	—	—
<i>Pimentonum</i>	Almost insoluble	Soluble	Soluble	Soluble	—	Slightly soluble	—
<i>Phenacetinum</i>	1 in 1,700	1 in 21	Soluble	Soluble	—	—	—
<i>Phenazonum</i>	1 in 1-2	1 in 1-3	1 in 50	1 in 1-3	—	—	—
<i>Phenobarbitonum</i>	About 1 in 1000	1 in 15	1 in 15 at 25° (U.S.P.)	1 in 40 at 25° (U.S.P.)	—	—	—
<i>Phenobarbitonum Solubile</i>	Very soluble	Soluble	Insoluble	Insoluble	—	7 in 2	Soluble
<i>Phenol</i>	1 in 13	6 in 1	4 in 1	3 in 1	—	—	Slightly soluble in fixed oils
<i>Phenolphthalinum</i>	1 in 600	1 in 10	1 in 144	—	—	—	—
<i>Phenyhydrargyri Nitrus</i>	1 in 160 (boiling)	1 in 1000 (95%)	—	—	—	—	—
<i>Phenytoinum Solubile</i>	Very soluble	Sparsely soluble (85%)	—	—	—	—	—
<i>Phyostigminae Salicylas</i>	1 in 100	1 in 12	1 in 250 at 25° (U.S.P.)	1 in 6 at 25° (U.S.P.)	—	—	—
<i>Philocarpine Nitrus</i>	1 in 8	1 in 50	Almost insoluble	Almost insoluble	—	—	—
<i>Pix Carbonia Preparata</i>	Almost insoluble	Partially	Partially	Almost entirely soluble	—	—	—
<i>Pix Liquida</i>	Almost insoluble	1 in 10	Soluble	Soluble	—	1 in 2	Soluble
<i>Plumbi Acetas</i>	1 in 2-5	1 in 30	—	—	—	—	—
<i>Plumbi Monoxidum</i>	Almost insoluble	Insoluble	—	—	—	—	—
<i>Podophylli Resina</i>	Insoluble	Soluble	Partially	Partially	—	—	—
<i>Potassae Sulphurata</i>	1 in 2	Partially	—	—	—	—	—
<i>Potassii Acetas</i>	1 in 0-5	1 in 2	—	—	—	—	—

TABLE OF SOLUBILITIES—(continued)

SUBSTANCE	SOLUBILITY IN					
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin	Fixed Oils and Liquid Paraffin
Potassii Bicarbonas.....	1 in 4	Almost insoluble	—	—	1 in 5 at 25° (U.S.P.)	—
Potassii Bromidum.....	1 in 2	1 in 200	—	—	—	—
Potassii Carbonas.....	1 in 1	Insoluble	—	—	—	—
Potassii Chloras.....	1 in 16	1 in 1,700	—	—	1 in 30	—
Potassii Citras.....	1 in 1	Almost insoluble	—	—	1 in 2	—
Potassii Hydroxidum.....	1 in 0.95	1 in 3	—	—	1 in 2.5	—
Potassii Iodidum.....	1 in 0.7	1 in 12	—	—	1 in 2	—
Potassii Nitras.....	1 in 4	1 in 620 at 25° (U.S.P.)	—	—	Soluble	—
Potassii Permanganas.....	1 in 20	—	—	—	—	—
Potassii Tetrates Acidus.....	1 in 220	Insoluble	—	—	—	—
Proflavine Hydrochloridum.....	1 in 1	1 in 8	Insoluble	Slowly soluble	1 in 10	Almost insoluble
Proflavine Sulphas.....	1 in 300	—	Almost insoluble	Almost insoluble	—	1 in 50 (olive oil and arachis oil)
Progesteronum.....	Very sparingly soluble	1 in 5 (95%)	—	—	—	1 in 40 (vegetable oils)
Propylis Hydroxybenzoas.....	1 in 2000	1 in 2 (95%) 1 in 2.5 (70%)	—	—	1 in 140	—
Pyroxylinum.....	—	1 in 1	1 in 3	—	—	—
Quinidine Sulphas.....	1 in 90	1 in 10	Insoluble	Insoluble	1 in 15 at 25° (U.S.P.)	—
Quinine Bisulphas.....	1 in 10	1 in 23	1 in 2500 at 25°	1 in 625 at 25° (U.S.P.)	—	—
Quinine Dihydrochloridum.....	1 in 0.6	1 in 12	Insoluble	1 in 7	—	—
Quinine et Æthylis Carbonas.....	Slightly soluble	1 in 2	1 in 10 at 25° (U.S.P.)	1 in 1 at 25° (U.S.P.)	—	—
Quinine Hydrochloridum.....	1 in 32	1 in 2	1 in 340 at 25° (U.S.P.)	1 in 9	1 in 7 at 25°	—
Quinine Sulphas.....	1 in 800	1 in 65	Almost insoluble	Almost insoluble	1 in 40	—
Quinine Tanus.....	Slightly soluble	Soluble	Slightly soluble	Slightly soluble	—	—
Resorcinol.....	1 in less than 1	1 in 1	Soluble	Slightly soluble	Soluble	Soluble in olive oil
Riboflavina.....	Slightly soluble	Sparingly soluble	Insoluble	Insoluble	—	—
Saccharinum Solubile.....	1 in 1.5 at 25°	1 in 50	—	—	—	—
Salicinum.....	1 in 28	1 in 80	Insoluble	Insoluble	—	—

	1 in 50	1 in 140	1 in 2-5	Slightly soluble	
Santonium	Almost completely soluble	—	—	—	—
Sapo Animalis	Almost completely soluble	—	—	—	—
Sapo Durus	Soluble	—	—	—	—
Sapo Mollis	Soluble	Partially or wholly soluble	—	—	—
Scammoniz Resina	Insoluble	1 in 60	—	—	Soluble warm
Serum	Insoluble	—	—	—	—
Sodii Benzoes	1 in 24	—	—	—	—
Sodii Bicarbonas	Insoluble	—	—	—	—
Sodii Bromidum	1 in 18	—	—	—	—
Sodii Carbonas	Insoluble	—	—	—	—
Sodii Chloridum	Sparingly soluble	—	—	1 in 10	—
Sodii Citras	Insoluble	—	—	—	—
Sodii et Potassii Tartaras	1 in less than 2	—	—	—	—
Sodii Hydroxidum	1 in 1-5	—	—	—	—
Sodii Iodidum	1 in 0-55	—	—	—	—
Sodii Lactas	Soluble	Insoluble	—	1 in 1	Insoluble
Sodii Metabisulphis	1 in 2	—	—	—	—
Sodii Morrhuas	Soluble	—	—	—	—
Sodii Nitris	1 in 1-5	—	—	—	—
Sodii Phosphas	1 in 7	—	—	—	—
Sodii Phosphas Acidus	About 1 in 1	—	—	—	—
Sodii Salicylas	1 in 1	—	—	—	—
Sodii Sulphas	1 in 3	—	—	—	—
Sodii Sulphas Exsiccatus	1 in 8	—	—	—	—
Sodii Thiosulphas	1 in 0-5 at 25°	—	—	1 in 4 at 25° (U.S.P.) Soluble	—
Subophtenum	Readily soluble	Almost insoluble	Almost insoluble	—	—
Stilbestrol	Very slightly soluble	Soluble	—	—	—
Strophanthinum	Soluble	Almost insoluble	Very sparingly soluble	—	—
Styracinae Hydrochloridum	1 in 40	Insoluble	—	—	—
Styrax	Insoluble	Entirely soluble	Insoluble	—	—
Sucrosum	1 in 0-5	1 in 60	—	—	—
Sulphacetamidum	1 in 150 (20°)	1 in 15 (95%)	Insoluble	—	—
Sulphacetamidum	1 in 150 (15-5°)	Sparingly soluble (65%)	Insoluble	—	—
Sulphanilamidum	1 in 170 (20°)	—	—	—	—
Sulphanilamidum	1 in 115 (25°)	—	—	—	—

TABLE OF SOLUBILITIES—(continued)

SUBSTANCE	SOLUBILITY IN					
	Water	Alcohol (90%)	Ether	Chloroform	Glycerin	Fixed Oils and Liquid Paraffin
Sulphapyridine	1 in 3000 (20°) 1 in 100 (boiling) 1 in 2500	1 in 400 (95%) Slightly soluble (95%)	— —	— —	— —	— —
Sulphathiazolum	—	Slightly soluble (95%)	—	—	—	—
Sulpharsphenamine	Soluble 1 in 450	Insoluble 1 in 80	Insoluble 1 in 90	1 in 3 Soluble	—	—
Sulphonal	—	—	—	—	—	—
Sulphur Precipitatum	Almost insoluble	Almost insoluble	Soluble	1 in 70 at 25°	—	1 in 100 in olive oil at 25° (U.S.P.)
Sulphur Sublimatum	Almost insoluble	Almost insoluble	1 in 150 at 25°	—	—	—
Suraminum	Freely soluble	Slightly soluble (95%)	Insoluble	Insoluble	—	—
Taraceum	Almost insoluble	1 in 5	1 in 3-75 Soluble	Miscible	—	Miscible
Terpineol	Insoluble	1 in 2 (70%)	—	—	—	About 1 in 20 (olive oil and arachis oil)
Testosterone Propionas	Almost insoluble	About 1 in 30 (95%)	—	—	—	—
Testosterone	Almost insoluble	About 1 in 25 (95%)	—	—	—	—
Theobromina et Sodii Salicylas Theophyllina et Sodii Acetas	1 in 1 1 in 25 1 in 1000	Insoluble Insoluble 1 in 1	Insoluble Insoluble 1 in 1-5	Insoluble Insoluble 1 in 0-6	— 1 in 190	— 1 in 2 in olive oil at 25° (U.S.P.)
Thymol	—	—	—	—	—	—
Thyroxine sodium	Sparsely soluble	—	—	—	—	—
Totaquina	Almost insoluble	Soluble warm	Partially	Almost com- pletely soluble 1 in 35 at 25° (U.S.P.)	—	—
Trinitrophenol	1 in 90	1 in 10	1 in 25	Insoluble	—	—
Tryparsamidum	Freely soluble	Slightly soluble (95%)	Insoluble	Insoluble	—	—
Urea	1 in 1 1 in 2	1 in 3 1 in 1 (95%)	Insoluble Soluble	Insoluble Soluble	Soluble	Soluble in fixed oils
Urethranum	—	—	—	—	—	—
Zinci Chloridum	1 in 0-4	1 in 1-5	Soluble	—	1 in 2	—
Zinci Oxidum	Insoluble	Insoluble	—	—	—	—
Zinci Stearates	Insoluble	Insoluble	—	—	—	—
Zinci Sulphas	1 in 0-7	Insoluble	Insoluble	—	1 in 2-5 at 25° (U.S.P.)	—

REMOVAL OF STAINS

Stains	On cloth Removed with:—	On the skin Removed with:—
Acid, Picric	Sodium carbonate solution, hot	Sodium benzoate solution.
Acid, Pyrogallie	First moisten with ferrous sulphate, and then wash in oxalic acid solution	On fingers, use pot. carb. 1 oz., chlorinated lime $\frac{1}{2}$ oz., water 4 oz., or add $\frac{1}{2}$ or 2 dr. of sulphuric acid to $\frac{1}{2}$ pint of 25% sodium sulphite sol. and use $\frac{1}{2}$ oz. of this with 4 oz. of water. Ammonium persulphate sol. good.
Acridiflavine	Dilute HCl and bleach after	Sulphurous acid, or dil. H_2SO_4 and spirit.
Bromine	Sodium hydroxide solution	Dilute ammonia solution, or carron oil.
Carbol Fuchsine	Sulphuric acid and water. Repeat several times if necessary	Sulphuric acid and water.
Cochineal	Hot water	Soap and water.
Crocus (Saffron)	Wash with HCl and boil with washing soda	Washing soda in water.
Eosin	Strong hydrochloric acid	Strong hydrochloric acid.
Ferric Chloride	Oxalic acid solution	Oxalic acid solution.
Gentian Violet	Dil. H_2SO_4 and hypochlorite as bleach after	Spirit.
Hæmatoxylin (Logwood)..	Render acid and then alkaline and bleach	Make alkaline and wash with hypochlorite.
Henna	HCl and hot water	Hypochlorite.
Ink, black	Oxalic acid, and finally bleach with hypochlorite	Soap and water.
Ink, red (if made with eosin)	Hydrochloric acid, and wash well	Strong hydrochloric acid.
Ink, typewriting (purple)	Dilute hydrochloric acid	Dilute hydrochloric acid.
Iodine, Tincture of	15% to 20% warm sodium thiosulphate	
Methylene Blue	Wash with dil. H_2SO_4 and use hypochlorite after. Spirit also helps	Spirit removes easily.
Potassium Chromate	Washes out with water	Soap and water.
Potassium Permanganate ..	Sulphurous acid	Tartaric or hydrochloric acid, sulphur dioxide or thiosulphate.
Silver Nitrate	Wash with solution of iodine 2, pot. iod. 10, liq. ammon. 1, water 100, allow to soak in, then rinse with ammonia	As for cloth.
Tobacco Stains		Chlorinated soda solution or potassium permanganate, followed by SO_2 .
Walnut Juice	Soap and hot water	Soap and water.

THERMOMETRIC EQUIVALENTS

Fahrenheit Converted to Centigrade Scale

$$\left(^{\circ}\text{C.} \times \frac{9}{5}\right) + 32 = ^{\circ}\text{F.}$$

$^{\circ}\text{F.}$	$^{\circ}\text{C.}$	$^{\circ}\text{F.}$	$^{\circ}\text{C.}$	$^{\circ}\text{F.}$	$^{\circ}\text{C.}$	$^{\circ}\text{F.}$	$^{\circ}\text{C.}$
32	0.0	70	21.1	108	42.2	146	63.3
33	0.6	71	21.7	109	42.8	147	63.9
34	1.1	72	22.2	110	43.3	148	64.4
35	1.7	73	22.8	111	43.9	149	65.0
36	2.2	74	23.3	112	44.4	150	65.6
37	2.8	75	23.9	113	45.0	151	66.1
38	3.3	76	24.4	114	45.6	152	66.7
39	3.9	77	25.0	115	46.1	153	67.2
40	4.4	78	25.6	116	46.7	154	67.8
41	5.0	79	26.1	117	47.2	155	68.3
42	5.6	80	26.7	118	47.8	156	68.9
43	6.1	81	27.2	119	48.3	157	69.4
44	6.7	82	27.8	120	48.9	158	70.0
45	7.2	83	28.3	121	49.4	159	70.6
46	7.8	84	28.9	122	50.0	160	71.1
47	8.3	85	29.4	123	50.6	161	71.7
48	8.9	86	30.0	124	51.1	162	72.2
49	9.4	87	30.6	125	51.7	163	72.8
50	10.0	88	31.1	126	52.2	164	73.3
51	10.6	89	31.7	127	52.8	165	73.9
52	11.1	90	32.2	128	53.3	166	74.4
53	11.7	91	32.8	129	53.9	167	75.0
54	12.2	92	33.3	130	54.4	168	75.6
55	12.8	93	33.9	131	55.0	169	76.1
56	13.3	94	34.4	132	55.6	170	76.7
57	13.9	95	35.0	133	56.1	171	77.2
58	14.4	96	35.6	134	56.7	172	77.8
59	15.0	97	36.1	135	57.2	173	78.3
60	15.6	98	36.7	136	57.8	174	78.9
61	16.1	99	37.2	137	58.3	175	79.4
62	16.7	100	37.8	138	58.9	176	80.0
63	17.2	101	38.3	139	59.4	177	80.6
64	17.8	102	38.9	140	60.0	178	81.1
65	18.3	103	39.4	141	60.6	179	81.7
66	18.9	104	40.0	142	61.1	180	82.2
67	19.4	105	40.6	143	61.7	190	87.8
68	20.0	106	41.1	144	62.2	200	93.3
69	20.6	107	41.7	145	62.8	212	100.0

THERMOMETRIC EQUIVALENTS
Centigrade Converted to Fahrenheit Scale

$$(^{\circ}\text{F.} - 32) \times \frac{5}{9} = ^{\circ}\text{C.}$$

$^{\circ}\text{C.}$	$^{\circ}\text{F.}$	$^{\circ}\text{C.}$	$^{\circ}\text{F.}$	$^{\circ}\text{C.}$	$^{\circ}\text{F.}$	$^{\circ}\text{C.}$	$^{\circ}\text{F.}$
0	32.0	38	100.4	76	168.8	114	237.2
1	33.8	39	102.2	77	170.6	115	239.0
2	35.6	40	104.0	78	172.4	116	240.8
3	37.4	41	105.8	79	174.2	117	242.6
4	39.2	42	107.6	80	176.0	118	244.4
5	41.0	43	109.4	81	177.8	119	246.2
6	42.8	44	111.2	82	179.6	120	248.0
7	44.6	45	113.0	83	181.4	121	249.8
8	46.4	46	114.8	84	183.2	122	251.6
9	48.2	47	116.6	85	185.0	123	253.4
10	50.0	48	118.4	86	186.8	124	255.2
11	51.8	49	120.2	87	188.6	125	257.0
12	53.6	50	122.0	88	190.4	126	258.8
13	55.4	51	123.8	89	192.2	127	260.6
14	57.2	52	125.6	90	194.0	128	262.4
15	59.0	53	127.4	91	195.8	129	264.2
16	60.8	54	129.2	92	197.6	130	266.0
17	62.6	55	131.0	93	199.4	131	267.8
18	64.4	56	132.8	94	201.2	132	269.6
19	66.2	57	134.6	95	203.0	133	271.4
20	68.0	58	136.4	96	204.8	134	273.2
21	69.8	59	138.2	97	206.6	135	275.0
22	71.6	60	140.0	98	208.4	136	276.8
23	73.4	61	141.8	99	210.2	137	278.6
24	75.2	62	143.6	100	212.0	138	280.4
25	77.0	63	145.4	101	213.8	139	282.2
26	78.8	64	147.2	102	215.6	140	284.0
27	80.6	65	149.0	103	217.4	141	285.8
28	82.4	66	150.8	104	219.2	142	287.6
29	84.2	67	152.6	105	221.0	143	289.4
30	86.0	68	154.4	106	222.8	144	291.2
31	87.8	69	156.2	107	224.6	145	293.0
32	89.6	70	158.0	108	226.4	146	294.8
33	91.4	71	159.8	109	228.2	147	296.6
34	93.2	72	161.6	110	230.0	148	298.4
35	95.0	73	163.4	111	231.8	149	300.2
36	96.8	74	165.2	112	233.6	150	302.0
37	98.6	75	167.0	113	235.4		

TEMPERATURE OF VARIOUS FREEZING-MIXTURES

(a) Materials at 10° C. at commencement:—

Sodium acetate, cryst.	17	} —4°
Water	20	
Sodium thiosulphate, cryst.	11	} —8°
Water	10	
Sodium chloride	9	} —12°
Water	25	
Ammonium nitrate, powdered	1	} —16°
Water	1	
Sodium sulphate	3	} —19°
Nitric acid	2	
Sodium sulphate	6	} —23°
Ammonium chloride	4	
Potassium nitrate	2	
Nitric acid	4	
Sodium sulphate	6	} —26°
Ammonium nitrate	5	
Nitric acid	4	
Sodium phosphate	9	} —29°
Nitric acid	4	

(b) Materials at 0° C. at commencement:—

Calcium chloride, dihydrate	5	} —9°
Snow, or powdered ice	12	
Snow, or powdered ice	2	} —20°
Sodium chloride	1	
Snow, or powdered ice	12	} —31°
Sodium chloride	5	
Ammonium nitrate	5	
Snow, or powdered ice	3	} —48°
Calcium chloride, cryst.	4	

(c) Materials below 0° C. at commencement:—

Alcohol at 4°	}	—72°
Solid carbon dioxide		
Chloroform	}	—77°
Solid carbon dioxide		
Ether	}	—100°
Solid carbon dioxide		

SOME ANTI-FREEZE SOLUTIONS

(a) Alcohol-Water Mixtures:—

% v/v Alcohol	Freezing Point °C.
3.1	— 1.0
8.5	— 3.0
14.0	— 5.0
20.0	— 7.5
25.0	— 10.5
29.5	— 14.0
32.5	— 16.0
36.0	— 18.8
40.5	— 28.7
54.0	— 34.0

(b) Glycerin-Water Mixtures:—

% w/w Glycerin	Freezing Point °C.	Sp. Gr. at 20°
10	— 1.6	1.024
20	— 4.8	1.049
30	— 9.5	1.075
40	— 15.4	1.101
50	— 22.0	1.128
60	— 33.6	1.156

(c) Ethylene Glycol-Water Mixtures:—

% w/w Ethylene Glycol	Freezing Point °C.	Sp. Gr. at 15°
10	— 3.6	1.013
20	— 7.9	1.026
25	— 10.7	1.033
30	— 14.0	1.040
40	— 22.3	1.053
50	— 33.8	1.067
60	— 49.3	1.079

ADJUSTMENT OF SPECIFIC GRAVITY OF A LIQUID

The specific gravity of a liquid may be adjusted by dilution according to the Alligation method.

Higher specific gravity — desired specific gravity = proportion of liquid of lower specific gravity to be used.

Desired specific gravity — lower specific gravity = proportion of liquid of higher specific gravity to be used.

For example, to obtain a liquid of sp. gr. 1.275 by diluting a liquid of sp. gr. 1.425 with water (sp. gr. 1.000):—

$1.425 - 1.275 = 0.150$, the volume of water to be used:

$1.275 - 1.000 = 0.275$, the volume of the heavier liquid.

These proportions can be taken in any units by volume, and their correctness can be verified by calculation.

With sulphuric acid, alcohol and other liquids the contraction of the resulting mixture has to be taken into account, and for this special tables must be consulted.

FORENSIC PHARMACY

THE PHARMACY AND POISONS ACT, 1933

The Pharmacy and Poisons Act, 1933, defines a pharmacist as a person registered either in the Register of Chemists and Druggists or in the Register of Pharmaceutical Chemists. Registration is effected by sending to the Registrar the registration fee and a certificate granted by the examiners appointed under the Pharmacy Acts, or by a Dominion pharmaceutical body with which the Pharmaceutical Society of Great Britain has entered into an agreement for the reciprocal exchange of qualifications. The name of the person registered is retained on the register in subsequent years by payment of an annual retention fee.

In order to become an authorised seller of poisons, a pharmacist or the representatives of a pharmacist who is deceased, bankrupt, or of unsound mind, must have a pharmacist in control in every premises where the retail sale of drugs is carried on and the certificate of registration of the pharmacist in control must be exhibited in the premises. In addition to complying with the above conditions, a corporate body, in order to become an authorised seller of poisons, must register a pharmacist as superintendent with the Pharmaceutical Society. Authorised sellers of poisons must cause all premises, where they carry on the retail sale of drugs, to be registered and, in January of each year, they must send a list of all such premises to the Registrar together with the names of the pharmacists in charge. A registration fee must be paid in the first instance, and, subsequently, an annual retention fee. The conditions requiring the business to be under the personal control of a pharmacist need not be complied with where the sale of drugs does not constitute a substantial portion of the business. (*See 1941 Act.*)

The Act restricts the use of the title "Pharmaceutical Chemist" or "Pharmaceutist" to persons registered as pharmaceutical chemists and the title "Pharmacist" or "Member of the Pharmaceutical Society" to pharmacists. The titles "Chemist and Druggist", "Druggist" or "Chemist" are restricted to pharmacists or corporate bodies having a registered superintendent on the governing body, the latter title being so restricted only when used in connection with the sale of goods by retail. The representatives of pharmacists who are deceased, bankrupt or of unsound mind may, for a limited period of time, use in connection with the business name of the pharmacist any titles, emblems, or descriptions which the pharmacist might have used. The word "Pharmacy" may be applied only to the premises of an authorised seller of poisons.

The Statutory Committee, established by the Act, is composed of six persons, five of whom are appointed by the Council of the Pharmaceutical Society and one, who is the Chairman and must be a person having practical legal experience, appointed by the Privy Council. One of the five persons appointed by the Council must be a pharmacist resident in Scotland. The Statutory Committee is a disciplinary body having the duty of inquiring into cases where a pharmacist or an authorised seller of poisons, or an employee, is alleged to have been guilty of misconduct or to have been convicted of a criminal offence. It may direct that the name of a pharmacist shall be removed from the register or that a corporate body shall be disqualified from acting as an authorised seller of poisons or that all or part of the premises of a corporate body shall be removed from the Register of Premises. If the Committee thinks fit in any case it may direct the restoration of the person or the removal of disqualification of the body corporate concerned, but there is no provision for removing disqualifications imposed on representatives.

The following summary provides a general outline of the principal provisions of the Pharmacy and Poisons Act, 1933, and the Poisons Rules, 1935, as amended by the Poisons (Amendment) Rules, 1937, 1938, 1940, 1941 and 1942, in so far as they affect the treatment of poisons by persons carrying on a chemist's business.

STATUTORY POISONS. For the purposes of the Pharmacy and Poisons Act, 1933, poisons are those substances, or articles containing any one of them, which are contained in the Poisons List issued by the Home Secretary and which, as amended by the Poisons List (Amendment) Orders, 1937, 1938 and 1940, is set out in full on pages 195-6. The Poisons List is divided into two parts. In general, poisons included in Part I of the List may be sold or supplied to the public only by pharmacists, while those in Part II of the List may be sold by pharmacists and by a person whose name has been entered in a list by the local authority, as defined by the Act, in whose area that person's premises are situated.

The sale or supply of poisons may be effected only at registered premises and subject to compliance with the provisions of the Act and the Rules made under the Act.

The Poisons Rules, 1935, as amended, refer to a number of Schedules which are set out in full on pages 197 to 208, and of which a summary is given below.

SCHEDULES

First Schedule.

Substances falling within the Poisons List to which special restrictions apply.

Second Schedule.

Poisons exempted by Rule 5 (2) from labelling provisions when sold or supplied in certain circumstances.

Third Schedule.

Articles exempted by Rule 11 from the provisions of the Act and of the Rules.

Fourth Schedule.

Substances required by Rule 12 to be sold by retail only upon a prescription given by a qualified medical practitioner, registered dentist or registered veterinary surgeon.

Fifth Schedule.

Form to which the substances specified are restricted when sold by listed sellers of Part II poisons. (Rule 14 (2) (a)).

Sixth Schedule.

Statement of particulars as to proportion of the poison in certain cases permitted by Rule 18 (2).

Seventh Schedule.

Indication of character prescribed by Rule 19 for the purposes of section 18 (1) (c) (iii) of the Act.

Eighth Schedule.

Poisons to which Rule 25 (Transport) applies.

Ninth Schedule.

Form of application to be made to the local authority by a person desiring his name to be entered in the list kept by local authorities in pursuance of section 21 of the Act. (Rule 30 (1)).

Tenth Schedule.

Form of the list to be kept by local authorities in pursuance of section 21 (1) of the Act. (Rule 30 (3)).

Eleventh Schedule.

Certificate for the purchase of a poison. (Rule 31).

Twelfth Schedule.

Form of entry required by Rule 32 to be made in the book to be kept by sellers of poisons in accordance with section 18 (2) (b) of the Act.

Thirteenth Schedule.

Form of authority for the purchase of strychnine for killing moles in pursuance of proviso (e) to Rule 15.

Fourteenth Schedule.

Form of authority for the purchase of strychnine for killing seals in pursuance of proviso (f) of Rule 15.

For the purpose of their treatment by persons carrying on a chemist's business, all poisons may be regarded as coming within the following classes:—

Class I.—Substances in the First Schedule.

Class II.—Substances not in the First or Fourth Schedule.

Class III.—Dispensed medicines.

Class IV.—Substances in the Fourth Schedule.

CLASS I—SUBSTANCES IN THE FIRST SCHEDULE

Purchaser***The purchaser must either—***

1. Be known to the seller or to a pharmacist-employee of the seller as a person to whom the poison may properly be sold;
or
2. Present a certificate, in the form prescribed in the Eleventh Schedule to the Rules, given by *either*
 - (a) A householder known to the seller as a responsible person of good character; *or*
 - (b) A householder, and endorsed by a police officer in charge of a police station. (The certificate must be retained by the seller, but no period of time is stated).

Records

- (A) ***Enter in Poisons Book***, the form of which is set out in the Twelfth Schedule to the Rules, and which must be kept for two years from the date of last entry—

1. Date of Sale.
2. Name, address and business, trade or occupation of purchaser.
3. Name and address of person giving certificate, if any, and the date of the certificate.
4. Name and quantity of substance.
5. Purposes for which it is stated to be required.

- (B) ***Purchaser must sign the entry, except in the case of a sale for the purposes of a trade, business or profession, when—***

1. Purchaser sends a Signed Order, which the seller must keep for two years, stating—
 - (a) Name and address of purchaser;
 - (b) Trade, business or profession (may be omitted if order from hospital, infirmary, dispensary or clinic);
 - (c) Name and quantity of substance;
 - (d) Purpose for which the substance is required.(The seller must satisfy himself of the genuineness of the purchaser's signature and trade, etc., and that the substance is used in the trade, etc., stated. In a case of genuine urgency, supply is permitted on undertaking of the purchaser to furnish a signed order within twenty-four hours).
2. Seller enters words "Signed Order" in space provided for purchaser's signature and a reference number to identify order.
3. If the substance is sent by post, it is sent by registered post.

Labelling***The label must show—***

1. Name of seller and address of premises on which sold;
(If more than one name and address is on the label, words must be used indicating the particular name and address of seller).

2. Name of poison;
 - (a) If a B.P. or B.P.C. preparation or substance, or any dilution, concentration or admixture of such, the official name, synonym or abbreviated name must be used followed by the letters B.P. or B.P.C. as the case may be.
 - (b) If not included in the B.P. or B.P.C. and the term under which the poison is included in the Poisons List describes the poison specifically that name must be used.
 - (c) If the Poisons List name describes a group of poisons and not the poison specifically, method (a) must be followed if the preparation or substance is the subject of a B.P. or B.P.C. monograph. In all other cases the accepted scientific name or a name descriptive of the true nature or origin of the poison must be used.
 - (d) Nux vomica and opium preparations may be disclosed in terms of strychnine or morphine or one of the official names for these alkaloids or their salts given at the head of the B.P. or B.P.C. monograph.
 3. Proportion of Poison if substance contains other ingredients than the poison;
(Not necessary if substance is B.P. or B.P.C. preparation. If given in form of percentage, state whether w/v, v/v, w/w. For tablets, pills, etc., quantity of poison in each and number may be stated. If poison is contained in B.P. or B.P.C. preparation which is an ingredient of the substance, the proportion of the preparation may be stated).
 4. The word "**Poison**" in red or against a red background.
(In case of allylisopropylacetylurea, phenylethylhydantoin or amphetamine made up ready to be taken the word "**Poison**" must be replaced by "**Caution; it is dangerous to take this preparation except under medical supervision,**" similarly in red or against a red background. The word "**Poison**" or "**Caution; it is dangerous to take this preparation except under medical supervision,**" as the case may be, must appear either (a) on a separate label or (b) within a line containing no words other than the particulars with which the substance is required to be labelled by the Act or Rules, and (c) must not be modified in meaning by other words or marks).
 5. The words "**For external use only**" and the name of the article, i.e., embrocation, liniment, lotion, etc., in case of liquid medicines for external application.
(Mouth-washes, eye-drops, eye-lotions, ear-drops, douches and similar articles are *not* regarded as medicines for external application for the purpose of this provision).
 6. The words "**Not to be taken**" in case of liquid non-medicines contained in bottles.
- (B) *The above particulars must appear clearly and in a conspicuous position on the actual container of the substance and on each*

covering, if any, of the container, except any covering which is transparent or is solely for the purpose of transport or delivery.
(Ampoules, cachets, capsules and similar articles are not containers or coverings for this purpose).

Container

1. The container must be impervious to the poison and strong enough to prevent leakage from ordinary risks of handling and transport.
2. A "poison" bottle (*i.e.*, a bottle fluted vertically with ribs or grooves recognisable by touch, but not necessarily of any particular colour or shape) must be used for liquids supplied in glass bottles of a capacity of not more than 120 fluid ounces and which are either non-medicines, or medicines for external use, or medicines for the internal treatment of human ailments not made up ready to be taken or not local anaesthetics for injection.
(Mouth-washes, eye-drops, eye-lotions, ear-drops, douches and similar articles are not regarded as medicines for the internal treatment of human ailments for the purpose of this provision).

Storage

(A) Container

Must be impervious to the poison and stout enough to prevent leakage from ordinary risks of handling.

(B) Position

Except that substances for use in agriculture or horticulture must be stored only in a cupboard or drawer reserved solely for such poisons or in such part of the premises as is described under (1) below in which no food is stored, any one or more of the following three methods may be used on the same premises and for the same poison.

1. In a part of the premises which is partitioned off or otherwise separated from the remainder of the premises and to which customers are not permitted to have access;
2. In a cupboard or drawer reserved solely for the storage of poisons;
3. On a shelf reserved solely for the storage of poisons provided that—
 - (a) no food is kept directly under the shelf, and
 - (b) the container of the substance is rendered distinguishable by touch from the containers of articles and substances other than poisons stored upon the same premises.

Transport

(A) When consigned for transport by a carrier, arsenical poisons, salts of barium, hydrocyanic acid, cyanides, nicotine, strychnine, salts of thallium, *except in the form of medicines*, must have the packages containing them labelled on the outside with—

1. The name or description of the poison quoted above.
2. A notice indicating that the package is to be kept separate from food and from empty containers in which food has been contained.

(B) The said articles must not be transported in any vehicle together with food, unless the food is in a separate part of the vehicle or is otherwise adequately protected from the risk of contamination.

Strychnine

Must not be sold except—

1. As an ingredient in a medicine; or
2. For the purpose of being compounded in medicine prescribed or administered by a doctor or veterinary surgeon; or
3. For scientific education or research or chemical analysis to a person or institution concerned therewith.
4. For the purpose of killing moles or seals, provided that the purchaser produces a written authority from the Agricultural Executive Committee or from the Secretary of State, respectively.

Colouring of Poisons

By the Poisons (Colouring) Rules, 1936, arsenates, arsenites, copper acetoarsenites, halides of arsenic, organic compounds of arsenic, oxides of arsenic, sodium thioarsenates, sulphides of arsenic, intended for use in agriculture or horticulture for the destruction of bacteria, fungi, insects, vermin or as weed killer may not be sold unless there has been added to the poison a dye of a distinctive colour and soluble in water.

These Rules do not apply to lead arsenate paste or lead arsenate powder, poisons which are of themselves of a distinctive colour, sheep dips which are already of a distinctive colour, and articles to be exported to purchasers outside the United Kingdom.

CLASS II—SUBSTANCES NOT IN FIRST OR FOURTH SCHEDULES

Labelling

(A) The label must show—

1. Name of seller and address of premises on which sold (see Class I—Labelling (A) 1.—page 189).
2. Name of Poison (see Class I—Labelling (A) 2.—page 190).
3. Proportion of Poison if substance contains other ingredients than the poison (see Class I—Labelling (A) 3.—page 190).
4. The word "*Poison*" or other indication of character prescribed in Schedule 7 to the Rules (see page 203).
(The word "*Poison*" or other prescribed indication of character as the case may be, must appear either (a) on a separate label or (b) within a line containing no words other than the particulars with which substance is required to be labelled by the Act or Rules, and (c) must not be modified in meaning by other words or marks).
5. The words "*For external use only*" and the name of the article, i.e., embrocation, liniment, lotion, etc., in case of liquid medicines for external application (see Class I—Labelling (A) 5.—page 190).
6. The words "*Not to be taken*" in the case of liquid non-medicines contained in bottles.

- (B) *The above particulars must appear clearly and in a conspicuous position on the actual container of the substance and on each covering, if any, of the container, except any covering which is transparent, or is solely for the purpose of transport or delivery. (In the case of packed preparations in cartons or wrappers sold as received from the manufacturer, name and address of seller need appear only on outer covering. (See also Class I—Labelling (B)—page 190).*

Container

As for Class I.—page 191.

Storage

Container must be impervious to the poison and stout enough to prevent leakage from ordinary risks of handling.

CLASS III—DISPENSED MEDICINES

This class includes any substance for the internal or external treatment of human ailments the required particulars of which have been recorded in the prescription book even though the medicine may not have been prescribed by a doctor. In the case of a Fourth Schedule substance the prescription requirements set out in Class IV must also be fulfilled.

Labelling**(A) The label must show—**

1. Name and address of seller (see Class I—Labelling (A) 1.—page 189).
2. The words "*For external use only*" and the name of the article, *i.e.*, embrocation, liniment, lotion, etc., in the case of liquid medicines for external application (see Class I—Labelling (A) 5.—page 190).

Records

Enter in prescription book on same or next day—

(A) When supplying for the first time

1. Date of supply.
2. Name of person to whom supplied.
3. Ingredients and quantity of medicine.
4. *If medicine is prescribed by doctor, dentist, or veterinary surgeon, name or initials, and, if known, address of prescriber, and, if known, address of person to whom prescription was given, and date on which prescription was given.*

(B) When repeating

1. Date of repeat.
2. Quantity of medicine.
3. Reference to original entry.

(The prescription book must be kept for two years from the date of last entry).

No entry is necessary for—

- (a) Prescriptions given by a doctor if the medicine is not in the First Schedule;
- (b) N.H.I. prescription;
- (c) Prescription given by a doctor on a form issued by a local authority for use in connection with a health

service of that authority, if prescription or copy is kept for two years and bears

- (i) date of dispensing;
- (ii) ingredients and quantity of medicine;
- (iii) name of person by whom, and name and address of person to whom, and date when prescription was given.

Container

Must be impervious to the poison and stout enough to prevent leakage from ordinary risks of handling and transport. (It is not essential to use a "Poison Bottle" for medicine for external use; the type of bottle to be used is left to the discretion of the supplier).

Storage

As Class I if in First Schedule.

As Class II if not in First Schedule.

CLASS IV—SUBSTANCES IN THE FOURTH SCHEDULE

Sale to the public permitted only upon the prescription of a doctor, dentist, or veterinary surgeon. No prescription is required for sale or supply to doctors, hospitals and other categories of users mentioned in Section 20 of the Pharmacy and Poisons Act, 1933. The seller may choose whether to dispense the substance, *i.e.*, comply with the requirements set out in Class III, or supply it "over the counter," *i.e.*, comply with the requirements set out in Class I. (Fourth Schedule substances are also First Schedule.)

Prescription

(A) *The prescription must be in writing and contain—*

1. Date when given.
2. Name and address of patient or, in the case of prescription given by veterinary surgeon, person to whom medicine is to be delivered.
3. Usual signature and address of prescriber. (Address is not required on (a) N.H.I. prescription or (b) prescription given by a doctor on a form issued by a local authority for use in connection with a health service of that authority).
4. The words "*For dental treatment only*" if given by dentist; the words "*For animal treatment only*" if given by a veterinary surgeon.
5. Total amount of medicine to be supplied and dose to be taken.

(B) *The prescription may be dispensed—*

1. Only once unless prescriber has stated on it that it may be dispensed more than once.
2. Only in accordance with the direction, if prescription contains a direction that it may be dispensed a stated number of times, or at stated intervals.

(C) *Each time it is dispensed the prescription must be marked above the signature of prescriber with—*

1. Name and address of seller;
2. Date of dispensing.

(D) The prescription must be retained (for two years) unless it may be dispensed again.

(No N.H.I. prescription need be retained. See Class III for circumstances in which Health Services prescriptions must be retained).

Labelling, Records and Container

The requirements here depend on whether the substance is (a) "dispensed" in the usual sense of the term, or (b) sold "over the counter." If (a), see Class III; if (b), see Class I.

Storage

As Class I.

THE POISONS LIST

(as amended by the Poisons List (Amendment) Orders, 1937, 1938 and 1940)

PART I

Acetanilide; alkyl acetanilides
Alkali fluorides other than those specified in Part II of this List
Alkaloids, the following; their salts, simple or complex—
Acetyldihydrocodeinone; its esters
Aconite, alkaloids of
Apomorphine
Atropine
Belladonna, alkaloids of
Benzoylmorphine
Benzylmorphine
Brucine
Calabar bean, alkaloids of
Coca, alkaloids of
Cocaine
Codeine
Colchicine
Coniine
Cotarnine
Curarine
Diacetylmorphine
Dihydrocodeinone; its esters
Dihydrohydroxycodeinone; its esters
Dihydromorphine; its esters
Dihydromorphinone; its esters
Ecgonine; its esters
Emetine
Ephedra, alkaloids of
Ergot, alkaloids of
Ethylmorphine
Gelsemium, alkaloids of
Homatropine
Hyosine
Hyoscyamine
Jaborandi, alkaloids of
Lobelia, alkaloids of
Morphine
Papaverine
Pomegranate, alkaloids of
Quebracho, alkaloids of, other than the alkaloids of red quebracho
Sabadilla, alkaloids of

Solanaceous alkaloids not otherwise included in this List
Stavesacre, alkaloids of
Strychnine
Thebaine
Veratrum, alkaloids of
Yohimbe, alkaloids of
Allylisopropylacetylurea
Amidopyrine; its salts
Amino-alcohols, esterified with benzoic acid, phenylacetic acid, phenylpropionic acid, cinnamic acid or the derivatives of these acids
Amyl nitrite
Antimony, chlorides of; oxides of antimony; sulphides of antimony; antimonates; antimonites; organic compounds of antimony
Arsenical substances, the following, except those specified in Part II of this List:—arsenic, halides of; oxides of arsenic; arsenates; arsenites; organic compounds of arsenic
Barbituric acid; its salts; derivatives of barbituric acid; their salts; compounds of barbituric acid, its salts, its derivatives, their salts, with any other substance
Barium, salts of, other than barium sulphate and the salts of barium specified in Part II of this List
Beta-aminopropylbenzene; its salts; its N-alkyl derivatives; their salts; beta-aminopropylbenzene; its salts; its N-alkyl derivatives; their salts
Butyl chloral hydrate
Cannabis (the dried flowering or fruiting tops of *Cannabis sativa* Linn.); the resin of cannabis; extracts of cannabis; tinctures of cannabis; cannabin tannate
Cantharidin; cantharides
Chloroformamide

Chloral hydrate
 Chloroform
 Creosote obtained from wood
 Croton, oil of
 Digitalis, glycosides of; other active principles of digitalis
 Dinitrocresols; dinitronaphthols; dinitrophenols; dinitrothymols
 Elaterin
 Ergot (the sclerotia of any species of *Claviceps*); extracts of ergot; tinctures of ergot
 Erythrityl tetranitrate
 Glyceryl trinitrate
 Guanidines, the following:—polymethylene diguanidines, dipara-anisylphenetyl guanidine
 Hydrocyanic acid; cyanides; double cyanides of mercury and zinc
 Insulin
 Lead acetates; compounds of lead with acids from fixed oils
 Mannityl hexanitrate
 Mercury, oxides of; nitrates of mercury; mercuric ammonium chlorides; potassio-mercuric iodides; mercuric oxycyanides; mercuric thiocyanate
 Metanitrophenol; orthonitrophenol; paranitrophenol
 Nux Vomica
 Opium
 Orthocaine; its salts
 Ouabain
 Oxalic acid
 Oxycinchonic acid, derivatives of; their salts; their esters
 Para-aminobenzenesulphonamide; its salts; derivatives of para-amino-

benzenesulphonamide having any of the hydrogen atoms of the para-amino group or of the sulphonamide group substituted by another radical; their salts
 Para-amino-benzoic acid; esters of; their salts
 Phenetidylphenacetin
 Phenols (any member of the series of phenols of which the first member is phenol and of which the molecular composition varies from member to member by one atom of carbon and two atoms of hydrogen) except in substances containing less than sixty per cent., weight in weight, of phenols; compounds of phenol with a metal, except in substances containing less than the equivalent of sixty per cent., weight in weight, of phenols
 Phenylcinchoninic acid; salicylcinchonic acid; their salts; their esters
 Phenylethylhydantoin; its salts; its acyl derivatives; their salts
 Phosphorus, yellow
 Picric acid
 Picrotoxin
 Pituitary gland, the active principles of
 Savin, oil of
 Strophanthus; glycosides of strophanthus
 al; alkyl sulphonals
 Suprarenal gland, the active principles of; their salts
 Thallium, salts of
 Thyroid gland, the active principles of; their salts
 Tribromethyl alcohol

PART II

Ammonia
 Arsenical substances, the following:—

Arsenic sulphides
 Arsenious oxide
 Calcium arsenates
 Calcium arsenites
 Copper acetoarsenites
 Copper arsenates
 Copper arsenites
 Lead arsenates
 Potassium arsenites
 Sodium arsenates
 Sodium arsenites
 Sodium thioarsenates
 Barium, salts of, the following:—
 Barium carbonate
 Barium silicofluoride
 Formaldehyde
 Hydrochloric acid
 Hydrofluoric acid; potassium fluoride;

sodium fluoride; sodium silicofluoride
 Mercuric chloride; mercuric iodide; organic compounds of mercury
 Metallic oxalates
 Nicotine; its salts
 Nitric acid
 Nitrobenzene
 Phenols as defined in Part I of this List in substances containing less than sixty per cent., weight in weight, of phenols; compounds of phenol with a metal in substances containing less than the equivalent of sixty per cent., weight in weight, of phenols
 Phenylene diamines; toluene diamines; other alkylated-benzene diamines; their salts
 Potassium hydroxide
 Sodium hydroxide
 Sulphuric acid

(Note.—Several poisons in this List are exempted by the Poisons Rules (Rule 11 and Third Schedule) made by the Secretary of State under the Pharmacy and Poisons Act, 1933, from the application of the Act when present in certain specified substances or articles.)

SCHEDULES TO THE POISONS RULES

(as amended by the Poisons (Amendment) Rules, 1937, 1938, 1940, 1941 and 1942)

FIRST SCHEDULE

Substances falling within the Poisons List to which special restrictions apply.

Alkaloids, the following; their salts, simple or complex:—

Acetyldihydrocodeinone

Aconite, alkaloids of, except substances containing less than 0.02 per cent. of the alkaloids of aconite

Apomorphine except substances containing less than 0.2 per cent. of apomorphine

Atropine except substances containing less than 0.15 per cent. of atropine

Belladonna, alkaloids of, except substances containing less than 0.15 per cent. of the alkaloids of belladonna calculated as hyoscyamine

Benzoylmorphine

Benzylmorphine

Brucine except substances containing less than 0.2 per cent. of brucine

Calabar bean, alkaloids of

Coca, alkaloids of, except substances containing less than 0.1 per cent. of the alkaloids of coca

Cocaine except substances containing less than 0.1 per cent. of cocaine

Codeine except substances containing less than 1 per cent. of codeine

Colchicine except substances containing less than 0.5 per cent. of colchicine

Conine except substances containing less than 0.1 per cent. of conine

Cotamine except substances containing less than 0.2 per cent. of cotamine

Curarine

Diacetylmorphine

Dihydrocodeinone

Dihydrohydroxycodeinone

Dihydromorphine

Dihydromorphinone

Ecgonine except substances containing less than 0.1 per cent. of ecgonine

Emetine except substances containing less than 1 per cent. of emetine

Ergot, alkaloids of

Ethylmorphine except substances containing less than 0.2 per cent. of ethylmorphine.

Gelsemium, alkaloids of, except substances containing less than 0.1 per cent. of the alkaloids of gelsemium

Homatropine except substances containing less than 0.15 per cent. of homatropine.

Hyoscine except substances containing less than 0.15 per cent. of hyoscine

Hyoscyamine except substances containing less than 0.15 per cent. of hyoscyamine

Jaborandi, alkaloids of, except substances containing less than 0.5 per cent. of the alkaloids of jaborandi

Lobelia, alkaloids of, except substances containing less than 0.5 per cent. of the alkaloids of lobelia

Morphine except substances containing less than 0.2 per cent. of morphine calculated as anhydrous morphine

Nicotine

Papaverine except substances containing less than 1 per cent. of papaverine

Pomegranate, alkaloids of, except substances containing less than 0.5 per cent. of the alkaloids of pomegranate

Quebracho, alkaloids of

Sabadilla, alkaloids of, except substances containing less than 1 per cent. of the alkaloids of sabadilla

Solanaceous alkaloids, not otherwise included in this Schedule, except substances containing less than 0.15 per cent. of solanaceous alkaloids calculated as hyoscyamine

Stavesacre, alkaloids of, except substances containing less than 0.2 per cent. of the alkaloids of stavesacre

Strychnine except substances containing less than 0.2 per cent. of strychnine

Thebaine except substances containing less than 1 per cent. of thebaine

Veratrum, alkaloids of, except substances containing less than 1 per cent. of the alkaloids of veratrum

Yohimba, alkaloids of

FIRST SCHEDULE (*Contd.*)

Allylisopropylacetylurea
 Amidopyrine; its salts
 Amino-alcohols, esterified with benzoic acid, phenylacetic acid, phenylpropionic acid, cinnamic acid or the derivatives of these acids, except in substances containing less than 10 per cent. of esterified amino-alcohols
 Antimonial poisons except substances containing less than the equivalent of 1 per cent. of antimony trioxide
 Arsenical poisons except substances containing less than the equivalent of 0.01 per cent. of arsenic trioxide and except dentifrices containing less than 0.5 per cent. of acetarsol
 Barbituric acid; its salts; derivatives of barbituric acid; their salts; compounds of barbituric acid, its salts, its derivatives, their salts, with any other substance
 Barium, salts of
 Beta-aminopropylbenzene; its salts; its N-alkyl derivatives; their salts; beta-aminoisopropylbenzene; its salts; its N-alkyl derivatives; their salts
 Cannabis; the resin of cannabis; extracts of cannabis; tinctures of cannabis; cannabin
 Cantharidin except substances containing less than 0.01 per cent. of cantharidin
 Cantharidates except substances containing less than the equivalent of 0.01 per cent. of cantharidin
 Digitalis, glycosides and other active principles of, except substances containing less than 1 unit of activity (as defined in the British Pharmacopœia) in 2 grammes of the substance
 Dinitrocresols; dinitronaphthols; dinitrophenols; dinitrothymols
 Ergot; extracts of ergot; tinctures of ergot
 Guanidines, the following:—polymethylene diguanidines, dipara-anisylphenetylguanidine
 Hydrocyanic acid except substances containing less than 0.15 per cent., weight in weight, of hydrocyanic acid (HCN); cyanides except substances containing less than the equivalent of 0.1 per cent., weight in weight, of hydrocyanic acid (HCN); double cyanides of mercury and zinc
 Lead, compounds of, with acids from fixed oils
 Mercuric chloride except substances containing less than 1 per cent. of mercuric chloride; mercuric iodide except substances containing less than 2 per cent. of mercuric iodide; nitrates of mercury except substances containing less than the equivalent of 3 per cent., weight in weight, of mercury (Hg); potassio-mercuric iodides except substances containing less than the equivalent of 1 per cent. of mercuric iodide; organic compounds of mercury except substances containing less than the equivalent of 0.2 per cent., weight in weight, of mercury (Hg)
 Metanitrophenol; orthonitrophenol; paranitrophenol
 Nux Vomica except substances containing less than 0.2 per cent. of strychnine
 Opium except substances containing less than 0.2 per cent. of morphine calculated as anhydrous morphine
 Quabain
 Oxycinchonic acid, derivatives of; their salts; their esters
 Para-aminobenzenesulphonamide; its salts; derivatives of para-aminobenzenesulphonamide having any of the hydrogen atoms of the para-amino group or of the sulphonamide group substituted by another radical; their salts
 Phenetidylphenacetin
 Phenylcinchoninic acid; salicyl-cinchonic acid; their salts; their esters
 Phenylethylhydantoin; its salts; its acyl derivatives; their salts
 Picrotoxin
 Savin, oil of
 Strophanthus, glycosides of
 Sulphonal; alkyl sulphonals
 Thallium, salts of
 Tribromethyl alcohol

SECOND SCHEDULE

Poisons exempted by Rule 5 (2) from labelling provisions when sold or supplied in certain circumstances

Alkali fluorides
 Ammonia
 Antimony, chlorides of; oxides of antimony; sulphides of antimony; antimonates; antimonites
 Chloroform

SECOND SCHEDULE (Contd.)

Dinitroresols; dinitronaphthols; dinitrophenols
 Formaldehyde
 Glyceryl trinitrate
 Hydrochloric acid
 Hydrofluoric acid; sodium silicofluoride
 Lead acetates; compounds of lead with acids from fixed oils
 Mercuric chloride; mercuric iodide; organic compounds of mercury
 Mercury, oxides of; nitrates of mercury
 Metanitrophenol; orthonitrophenol; paranitrophenol
 Nitric acid
 Nitrobenzene
 Oxalic acid; metallic oxalates
 Phenols; compounds of phenol with a metal
 Phosphorus, yellow
 Picric acid
 Potassium hydroxide
 Sodium hydroxide
 Sulphuric acid

THIRD SCHEDULE

Articles exempted by Rule 11 from the provisions of the Act and of these Rules.

GROUP I

GENERAL EXEMPTIONS

Adhesives; anti-fouling compositions; builders' materials; ceramics; distempers; electrical valves; enamels; explosives; fillers; fireworks; glazes; glue; inks; lacquer solvents; loading materials; matches; motor fuels and lubricants; paints other than pharmaceutical paints; photographic paper; pigments; plastics; propellants; rubber; varnishes.

GROUP II

SPECIAL EXEMPTIONS

<i>Poison</i>	<i>Substance or article in which exempted</i>
Acetanilide; alkyl acetanilides	Substances not being preparations for the treatment of human ailments
Alkaloids	
Brucine	Surgical spirit containing not more than 0.015 per cent. of brucine
Emetine	Ipecacuanha; extracts and tinctures of ipecacuanha; substances containing less than 0.05 per cent. of emetine
Ephedra, alkaloids of	Substances containing less than 1 per cent. of the alkaloids of ephedra
Jaborandi, alkaloids of	Substances containing less than 0.025 per cent. of the alkaloids of jaborandi
Lobelia, alkaloids of	Preparations for the relief of asthma in the form of cigarettes, smoking mixtures or fumigants; substances containing less than 0.1 per cent. of the alkaloids of lobelia
Nicotine	Tobacco
Pomegranate, alkaloids of	Pomegranate bark
Solanaceous alkaloids	Stramonium contained in preparations for the relief of asthma in the form of cigarettes, smoking mixtures or fumigants
Stavesacre, alkaloids of	Soaps; ointments; lotions for external use
Ammonia	Substances not being solutions of ammonia or preparations containing solutions of ammonia; substances containing less than 5 per cent., weight in weight, of ammonia (NH ₃); refrigerators; smelling bottles

THIRD SCHEDULE

SPECIAL EXEMPTIONS (Contd.)

Antimony, chlorides of	Polishes
Arsenical poisons	Pyrites ores or sulphuric acid containing arsenical poisons as natural impurities
Barium, salts of	Witherite other than finely-ground witherite
Beta-aminopropylbenzene; its salts; its N-alkyl derivatives; their salts; beta-aminoisopropylbenzene; its salts; its N-alkyl derivatives; their salts	Appliances for inhalation in which the poison is absorbed in an inert solid material
Chloroform	Substances containing less than 10 per cent. of chloroform
Creosote obtained from wood	Substances containing less than 50 per cent. of creosote obtained from wood
Dinitrocresols	Substances not being preparations for the treatment of human ailments
Dinitrophenols	Substances not being preparations for the treatment of human ailments
Formaldehyde	Substances containing less than 5 per cent., weight in weight, of formaldehyde (H·CHO); photographic glazing or hardening solutions
Hydrochloric acid	Substances containing less than 9 per cent., weight in weight, of hydrochloric acid (HCl)
Lead acetate	Substances containing less than 4 per cent. of lead acetate
Lead, compounds of	Machine-spread plasters
Mercuric chloride	Batteries
Mercuric chloride; mercuric iodide; organic compounds of mercury	Dressings on seeds or bulbs
Mercury, nitrates of	Ointments containing less than the equivalent of 3 per cent., weight in weight, of mercury (Hg).
Nitric acid	Substances containing less than 9 per cent., weight in weight, of nitric acid (HNO ₃).
Nitrobenzene	Substances containing less than 0.1 per cent. of nitrobenzene; soaps containing less than 1 per cent. of nitrobenzene; polishes.
Oxalic acid; metallic oxalates	Laundry blue; polishes.
Phenols	Carvacrol;
	creosote obtained from coal tar;
	essential oils in which phenols occur naturally;
	medicines containing less than 1 per cent. of phenols;
	nasal sprays, mouthwashes, pastilles, lozenges, capsules, pessaries, ointments, or suppositories containing less than 2.5 per cent. of phenols;
	smelling bottles;
	soaps for washing;
	solid substances, other than pastilles, lozenges, capsules, pessaries, ointments and suppositories, containing less than 60 per cent. of phenols;
	tar (coal or wood), crude or refined;
	tertiary butyl-cresol;
	thymol
	Substances other than preparations for the dyeing of hair
Phenylene diamines; toluene diamines; other alkylated-benzene diamines; their salts	Substances containing less than 5 per cent. of picric acid
Picric acid	Substances containing less than 12 per cent. of potassium hydroxide; accumulators; batteries
Potassium hydroxide	Therapeutic substances containing less than 0.1 per cent. of sodium ethyl mercurithiosalicylate as a preservative
Sodium ethyl mercurithiosalicylate	Substances containing less than 3 per cent. of sodium fluoride as a preservative
Sodium fluoride	

Sodium hydroxide	Substances containing less than 12 per cent. of sodium hydroxide
Sodium silicofluoride	Substances containing less than 3 per cent. of sodium silicofluoride as a preservative
Sulphuric acid	Substances containing less than 9 per cent., weight in weight, of sulphuric acid (H_2SO_4); accumulators; batteries; fire extinguishers

FOURTH SCHEDULE

Substances required by Rule 12 to be sold by retail only upon a prescription given by a qualified medical practitioner, registered dentist or registered veterinary surgeon.

Amidopyrine; its salts
 Barbituric acid; its salts; derivatives of barbituric acid; their salts; compounds of barbituric acid, its salts, its derivatives, their salts, with any other substance
 Dinitroresols; dinitronaphthols; dinitrophenols; dinitrothymols
 Para-aminobenzenesulphonamide; its salts; derivatives of para-aminobenzenesulphonamide having any of the hydrogen atoms of the para-amino group or of the sulphonamide group substituted by another radical; their salts
 Phenylcinchoninic acid; salicyl-cinchoninic acid; their salts; their esters
 Sulphonal; alkyl sulphonals

FIFTH SCHEDULE

Form to which the substances specified are restricted when sold by listed sellers of Part II poisons. (Rule 14 (2) (a)).

<i>Poison.</i>	<i>Form to which sale is restricted.</i>
Arsenical substances—	Sheep dips, sheep washes
Arsenious oxide	" "
Arsenic sulphides	" "
Calcium arsenates	Agricultural and horticultural insecticides or fungicides
Calcium arsenites	
Copper acetoarsenite	
Copper arsenates	
Copper arsenites	
Lead arsenates	
Potassium arsenites	Sheep dips, sheep washes
Sodium arsenates	
Sodium arsenites	
Sodium thioarsenates	
Barium carbonate	Preparations for the destruction of rats and mice
Mercurial substances—	
Mercuric chloride	Agricultural and horticultural fungicides, seed and bulb dressings, insecticides
Mercuric iodide	Agricultural and horticultural fungicides, seed and bulb dressings
Organic compounds of mercury	" " " "
Metallic oxalates other than potassium quadroxalate	Photographic solutions or materials
Nitrobenzene	Agricultural and horticultural insecticides; substances for the treatment of bee disease; ointments for the treatment of animals

SIXTH SCHEDULE

Statement of particulars as to proportion of the poison in certain cases permitted by Rule 18 (2).

<i>Name of Poison</i>	<i>Particulars</i>
Alkaloids	The proportion of any one alkaloid of aconite that the preparation would be calculated to contain on the assumption that all the alkaloids of aconite in the preparation were that alkaloid.
Aconite, alkaloids of	

SIXTH SCHEDULE (Contd.)

- Belladonna, alkaloids of
Calabar bean, alkaloids of
Coca, alkaloids of
Ephedra, alkaloids of
Ergot, alkaloids of
Gelsemium, alkaloids of
Jaborandi, alkaloids of
Lobelia, alkaloids of
Pomegranate, alkaloids of
Quebracho, alkaloids of,
other than the alkaloids
of red quebracho
Sabadilla, alkaloids of
Solanaeous alkaloids not
otherwise included in
the Poisons List
Stavesacre, alkaloids of
Veratrum, alkaloids of
Yohimba, alkaloids of
Antimonial poisons
- The same as above, with the substitution for the reference to aconite of a reference to belladonna, calabar bean or such other of the said poisons as the case may require.
- Arsenical poisons
- The proportion of antimony trioxide (Sb_2O_3) or antimony pentoxide (Sb_2O_5) that the preparation would be calculated to contain on the assumption that the antimony (Sb) in the poison had been wholly converted into antimony trioxide or antimony pentoxide as the case may be.
- Barium, salts of
- The proportion of arsenic trioxide (As_2O_3) or arsenic pentoxide (As_2O_5) that the preparation would be calculated to contain on the assumption that the arsenic (As) in the poison had been wholly converted into arsenic trioxide or arsenic pentoxide as the case may be.
- Digitalis, glycosides of;
other active principles of
digitalis
- The proportion of one particular barium salt which the preparation would be calculated to contain on the assumption that the barium (Ba) in the poison had been wholly converted into that salt.
- Hydrocyanic acid; cyanides;
double cyanides of mercury and zinc
- The number of units of activity as defined in the British Pharmacopœia contained in a specified quantity of the preparation.
- Insulin
- The proportion of hydrocyanic acid (HCN) that the preparation would be calculated to contain on the assumption that the cyanides in the poison had been wholly converted into hydrocyanic acid.
- Lead, compounds of, with
acids from fixed oils
- The number of units of activity as defined in the British Pharmacopœia contained in a specified quantity of the preparation.
- Mercury, organic compounds of
Nux Vomica
- The proportion of lead oxide (PbO) that the preparation would be calculated to contain on the assumption that the lead in the poison had been wholly converted into lead oxide.
- Opium
- The proportion of organically-combined mercury (Hg) contained in the preparation.
- Phenols
- The proportion of strychnine contained in the preparation.
- Compounds of phenol
with a metal
- The proportion of morphine contained in the preparation.
- Pituitary gland, the active
principles of
- The proportion of phenols (added together) contained in the preparation.
- The proportion of phenols (added together) that the preparation would be calculated to contain on the assumption that the compounds of phenols with a metal had been wholly converted into the corresponding phenols.
- Either—
(a) the number of units of activity as defined in the British Pharmacopœia contained in a specified quantity of the preparation; or

	(b) the proportion of pituitary gland, or of anterior or of posterior lobe of the gland, as the case may be, contained in the preparation; or
	(c) the amount of pituitary gland, or of anterior or of posterior lobe of the gland, as the case may be, from which a specified quantity of the preparation was obtained, together with an indication whether the amount relates to fresh or to dried gland substance.
Potassium hydroxide	The proportion of potassium monoxide (K_2O) which the preparation would be calculated to contain on the assumption that the potassium hydroxide in the preparation had been wholly converted into potassium monoxide.
Sodium hydroxide	The proportion of sodium monoxide (Na_2O) which the preparation would be calculated to contain on the assumption that the sodium hydroxide in the preparation had been wholly converted into sodium monoxide.
Strophanthus, glycosides of	The amount of Standard Tincture of Strophanthus as defined in the British Pharmacopœia which possesses the same activity as a specified quantity of the preparation when assayed by the method described in the said Pharmacopœia.
Suprarenal gland, the active principles of; their salts	Either— (a) the proportion of suprarenal gland or of the cortex or of the medulla of the gland, as the case may be, contained in the preparation; or (b) the amount of suprarenal gland, or of the cortex or of the medulla of the gland, as the case may be, from which a specified quantity of the preparation was obtained, together with an indication whether the amount relates to fresh or to dried gland substance.
Thyroid gland, the active principles of; their salts	Either— (a) the proportion of thyroid gland contained in the preparation; or (b) the amount of thyroid gland from which a specified quantity of the preparation was obtained together with an indication whether the amount relates to fresh or to dried gland.

SEVENTH SCHEDULE

Indication of character prescribed by Rule 19 for the purposes of section 18 (1) (c) (iii) of the Act.

- To be labelled with the words "*Caution. It is dangerous to take this preparation except under medical supervision.*"—
Medicines made up ready for the internal treatment of human ailments if the poison is one of the following:—
 Allylisopropylacetylurea
 Beta-aminopropylbenzene; its salts; its N-alkyl derivatives; their salts; beta-aminoisopropylbenzene; its salts; its N-alkyl derivatives; their salts
 Insulin
 Phenylethylhydantoin; its salts; its acyl derivatives; their salts
 Pituitary gland, the active principles of
 Thyroid gland, the active principles of; their salts
- To be labelled with the words "*Caution. It is dangerous to exceed the stated dose.*"—
Medicines (other than medicines mentioned in paragraph 1 of this Schedule) made up ready for the internal treatment of human ailments except in the case of a substance included in the First Schedule.
- To be labelled with the words "*Poison. For animal treatment only.*"—
Medicines made up ready for the treatment of animals.

SEVENTH SCHEDULE (Contd.)

4. To be labelled with the words "*Caution. This preparation may cause serious inflammation of the skin in certain persons and should be used only in accordance with expert advice.*"—

Preparations for the dyeing of hair containing phenylenediamines, toluenediamines or other alkylated-benzene diamines or their salts.

5. To be labelled with the words "*Caution. This substance is caustic.*"—

Potassium hydroxide, sodium hydroxide, and articles containing either of those substances.

EIGHTH SCHEDULE.

Poisons to which Rule 25 (Transport) applies.

Arsenical poisons
Barium, salts of
Hydrocyanic acid; cyanides
Nicotine
Strychnine
Thallium, salts of

NINTH SCHEDULE

Form of application to be made to the local authority by a person desiring his name to be entered in the list kept by local authorities in pursuance of section 21 of the Act. (Rule 30 (1)).

PHARMACY AND POISONS ACT, 1933.

Form of application by a person to have his name entered in a local authority's list persons entitled to sell poisons included in Part II of the Poisons List.

To the { Town Clerk
Clerk of the County Council } of

I,
being engaged in the business of
hereby apply to have my name entered in the list kept in pursuance of section 21 of the above Act in respect of the following premises, namely,
.....
.....
.....

as a person entitled to sell from those premises poisons included in Part II of the Poisons List.

I hereby nominate

to act as my deputy (deputies) for the sale of poisons in accordance with Rule 14 (1) of the Poisons Rules.

Signature of applicant

Date

(The following note to be set out on the form).

NOTE.

The entry of a person's name on a local authority's list does not entitle that person to retail poisons in Part I of the Poisons List, which, by the provisions of the Act, may only be retailed by authorised sellers of poisons (i.e., registered pharmacists).

A person whose name is entered in a local authority's list (a listed seller of Part II poisons) is permitted, *subject to certain conditions* (see below), to sell the poisons in Part II of the Poisons List, namely:—

Ammonia; arsenic sulphides; arsenious oxide; calcium arsenates; calcium arsenites; copper acetoarsenites; copper arsenates; copper arsenites; lead arsenates; potassium arsenites; sodium arsenates; sodium arsenites; sodium thioarsenates; barium carbonate; barium silicofluoride; formaldehyde; hydrochloric acid (spirits of salt); hydrofluoric acid; potassium fluoride; sodium fluoride; sodium silicofluoride; mercuric chloride; mercuric iodide; organic compounds of mercury; nicotine and its salts; nitric acid; nitrobenzene; phenols (carbolic acid and its homologues) in

substances containing less than sixty per cent., weight in weight, of phenols; compounds of phenol with a metal in substances containing less than the equivalent of sixty per cent., weight in weight, of phenol; phenylene and toluene diamines and their salts (hair dyes); potassium hydroxide (caustic potash); potassium quadroxalate (salts of lemon); sodium hydroxide (caustic soda); sulphuric acid.

The requirements which apply to the sale of poisons by a listed seller of Part II poisons are laid down in section 18 of the Act and in the Poisons Rules.

The following is a summary of the requirements:—

A.—Requirements applying to all listed sellers of Part II poisons.

1. The sale must be effected on the premises specified in the local authority's list.
2. The container of the poison must be labelled with the various particulars and in the manner required by section 18 (1) (c) of the Act and Rules 16 to 21.
3. No poison may be sold except in containers which comply with the requirements of Rule 22.
4. In the case of any arsenical or mercurial substances (unless it contains no more than the small proportions of arsenic or mercury specified in the First Schedule to the Poisons Rules), and in the case of barium silicofluoride and nicotine, the purchaser must either (a) be known to the seller, or to the person in charge of the premises on which the substance is sold or of the department of the business in which the sale is effected, to be a person to whom the poison may properly be sold or (b) produce a valid certificate in the form prescribed in the Eleventh Schedule to the Rules. In addition, in the case of such poisons, the required particulars of the sale must be entered, before delivery, in the Poisons Book to be kept in the form prescribed in the Twelfth Schedule to the Rules and (subject to the exception next mentioned) the entry must be signed by the purchaser. (Rule 6). In the case of a sale to a person for the purpose of his trade or business (farmer, horticulturist, etc.), Rule 7 (3) permits his signature of the entry in the Poisons Book to be dispensed with upon certain conditions, one of which is that an order signed by the purchaser has previously been obtained.
5. Arsenical and mercurial substances, barium carbonate and nitrobenzene may be sold only in particular types of preparation as specified in the Fifth Schedule to the Rules (e.g., sodium arsenates in sheep dips, calcium arsenates in insecticides), and in containers labelled clearly with a notice of the special purpose for which they are to be used and with a warning that they are to be used for that purpose only. (Rule 14 (2) (e)).
6. No arsenical substance (other than lead arsenates, calcium arsenates and copper acetoarsenites), nor mercurial substances may be sold to private persons; such substances may be sold only to persons engaged in the trade or business of agriculture or horticulture and for the purpose of that business. (Rule 14 (2) (b)).
7. It is unlawful to store any poison except in a container impervious to the poison and sufficiently stout to prevent leakage from the container arising from the ordinary risks of handling. (Rule 23 (1)).
8. Any poison consigned for transport must be sufficiently stoutly packed to avoid leakage arising from the ordinary risks of handling and transport. The outside of the package of an arsenical or mercurial poison or of barium carbonate consigned for transport by a carrier must be labelled conspicuously with the name of the poison and a notice indicating that it is to be kept separate from food and from empty containers in which food has been contained; and no such poison may be knowingly transported in any vehicle in which food is being transported unless the food is carried in a part of the vehicle effectively separated from that containing the poison, or is otherwise adequately protected from the risk of contamination. (Rule 25).

B.—Additional requirements applying solely to listed shopkeepers.

1. No poison, other than ammonia, hydrochloric acid (spirits of salt), nitric acid, potassium quadroxalate (salts of lemon) and sulphuric acid, may be sold by a listed shopkeeper except in closed containers as closed by the manufacturer or other person from whom the poison was obtained. (Rule 14 (1) (a)).
2. Arsenical or mercurial substances (unless they contain not more than the small proportions of arsenic or mercury specified in the First Schedule to the Rules), barium silicofluoride and nicotine may not be sold except by the listed shopkeeper himself or by a responsible deputy nominated by him to the local authority in accordance with Rule 14 (1) (b).
3. Arsenical and mercurial substances (unless they contain no more than the small proportions of arsenic or mercury specified in the First Schedule to the Rules) and nicotine may not be stored on a shelf, but must be stored in a cupboard or drawer reserved solely for the storage of poisons to be used in agriculture or horticulture or in a part of the premises which is partitioned off or otherwise separated from the remainder of the premises, to which customers are not permitted to have access and in which no food is kept.

Barium silicofluoride must be stored either in a cupboard, drawer or shelf reserved solely for the storage of poisons, or in a part of the premises which is partitioned off or

NINTH SCHEDULE (Contd.)

otherwise separated from the remainder of the premises and to which customers are not permitted to have access. If barium silicofluoride is kept on a shelf no food may be kept directly under the shelf and the container of the substance must be rendered distinguishable by touch from the containers of articles and substances other than poisons stored upon the same premises. (Rule 23 (2)).

TENTH SCHEDULE.

Form of the list to be kept by local authorities in pursuance of section 21 (1) of the Act. (Rule 30 (3)).

PHARMACY AND POISONS ACT, 1933.*

List of persons entitled to sell poisons in Part II of the Poisons List.

Full Name.	Address of Premises.	Description of business carried on at the premises.	Name of Deputy (or deputies) permitted to sell.
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ELEVENTH SCHEDULE

Certificate for the purchase of a poison. (Rule 31).

For the purposes of subsection (2) (a) (i) of section 18 of the Pharmacy and Poisons Act, 1933, I, the undersigned, a householder occupying (a)..... hereby certify from my knowledge of (b)..... of (a)..... that he is a person to whom (c)..... may properly be supplied.

further certify that (d)..... is the signature of the said (b).

.....
Signature of householder giving certificate

Date.....

(a) Insert full postal address.

(b) Insert full name of intending purchaser.

Insert name of poison.
to sign his name here.

.....
Endorsement required by Rule 31 of the Poisons Rules to be made by a police officer in charge of a police station, when, but only when, the householder giving the certificate is not known to the seller of the poison to be a responsible person of good character.

I hereby certify that in so far as is known to the police of the district in which*..... resides he is a responsible person of good character.

Signature of Police Officer.....

Rank.....

In charge of Police Station at.....

Date.....

Office stamp of
Police Station.

* Insert full name of householder giving the certificate.

TWELFTH SCHEDULE

Form of entry required by Rule 32 to be made in the book to be kept by sellers of poisons in accordance with section 18 (2) (b) of the Act.

Date of Sale.	Name and quantity of poison supplied.	Purchaser's			Purpose for which stated to be required.	Date of certificate (if any).	Name and address of person giving certificate (if any).	Signature of purchaser, or where a signed order is permitted by the Poisons Rules, the date of the signed order.
		Name.	Address.	Business, trade or occupation.				

THIRTEENTH SCHEDULE

Authority for the purchase of strychnine in pursuance of proviso (e) to Rule 15.

hereby authorise (a).....to purchase, within
three months of the date hereof, (b).....ounces of strychnine for the
purpose of killing moles.

Signature of { Chairman
Executive Officer } * of the.....
Secretary

County War Agricultural Executive Committee. } *
Agricultural Executive Committee.

Date..

(a) Insert full name of intending purchaser.

(b) Insert amount authorised to be purchased which must not exceed four ounces.

* Delete words which do not apply.

FOURTEENTH SCHEDULE

*Form of Authority for the purchase of strychnine in pursuance of paragraph (f) of the
proviso to Rule 15 of the Poisons Rules, 1935.*

Authority No.

PART I.

(To be retained by the seller.)

I, being a person duly authorised by the Secretary of State, hereby authorise

a).....to purchase within three
months of the date hereof (b).....of strychnine for
the purpose of killing seals.

Signature.....

.....Department.

.....Date.

(Tear along dotted line.)

PART II.

(To be retained by the purchaser.)

The strychnine purchased under authority numbered.....
shall not be used for any purpose but that of killing seals at (c).....

Signature....

..Department.

.....Date.

(a) Insert full name of intending purchaser.

(b) Insert amount authorised to be purchased which must not exceed four ounces.

(c) Insert name of place or places where the strychnine may be used.

THE PHARMACY AND MEDICINES ACT, 1941

The Pharmacy and Medicines Act, 1941, repeals the Medicine Stamp Duties, amends in certain respects the Pharmacy and Poisons Act, 1933, and imposes certain restrictions upon the sale of medicines.

Under the 1941 Act it is not necessary for an authorised seller of poisons to have a pharmacist in control of a business if the sale of drugs does not constitute a substantial part of the business and no poisons in Part I of the Poisons List are sold from those premises. Provision is made for shops of an authorised seller of poisons, where it is proposed to sell no drugs and no Part I poisons, to be listed by a local authority for the sale of Part II poisons. If drugs as well as Part II poisons are sold from such premises they must be registered with the Society under Section I of the Act and not with the local authority. The sale of "loose" drugs, compounding or dispensing, the receipt of prescriptions and the distribution of medicines compounded or dispensed for the needs of a particular person, and the use of certain titles are prohibited in premises where there is no pharmacist. For the purposes of the Act, each separate department of a business is regarded as a separate premises.

The functions of the Statutory Committee are enlarged. Cases of misconduct or of a conviction for a criminal offence, on the part of an applicant for registration or restoration to the Register, committed at a time when the applicant was not registered, are now brought within its jurisdiction. The committee is also given power to consider cases in which a corporate body is involved at a time when it is not an authorised seller of poisons.

Prohibition of Advertisements

Subject to a number of exceptions, such as advertisements to the trade, it is unlawful for any person to take any part in the publication of any advertisement referring to any article, or articles of any description, in terms calculated to lead to their use for the treatment of human beings for any of the following diseases:

Bright's disease, cataract, diabetes, epilepsy or fits, glaucoma, locomotor ataxy, paralysis and tuberculosis.

Similarly it is unlawful for any person to take any part in the publication of any advertisement referring to any article, or articles of any description, in terms which are calculated to lead to their use for procuring the miscarriage of women.

Disclosure of Composition of Medicines

The Act requires that any article sold by retail consisting of or comprising a substance recommended as a medicine or any such article supplied as a sample to induce retail purchase must bear on the container a description of *either*

- (1) the substance itself, *or*
- (2) each of the active constituents it contains, *or*
- (3) each of the ingredients of which it has been compounded.

In addition, the approximate percentage or the approximate quantity of each active constituent or ingredient must be disclosed.

Method of Disclosure

It will be noted that there are two methods of disclosing the composition of articles which consist of more than one substance.

1. **The active constituents.** This means those constituents which are included for their medicinal effect. The other constituents need not be stated. For example, a tablet containing caffeine, phenacetin, codeine, talc, starch and colouring matter need only state the first three substances. Flavourings, colourings, and inert diluents in a mixture need not be stated but every constituent which contributes to the medicinal value must be given, e.g., in a child's carminative the diluent, dill water, would be disclosed.
2. **The ingredients.** This method is intended for those articles in respect of which the active constituents are not definitely known. All that is definitely known is what is put into the article and in this case every ingredient which is put in whether "active" or not must be stated.

The disclosure of formula must in every instance be made on the innermost container or a label affixed to the innermost container. A bottle with carton and outer wrapping must have the disclosure on the bottle.

Articles such as proprietary headache powders which are often supplied singly, should have the disclosure on each individual powder.

Method of Describing Substance, Active Constituents or Ingredients

1. When no poison is present

1. If the substance, active constituent or ingredient is B.P. or B.P.C. use either:
 - (a) Latin name in full, or
 - (b) English name in full, or
 - (c) Latin abbreviation, or
 - (d) Synonym.

These must be in the exact form set out at the head of the monographs.

2. If the substance, active constituent or ingredient is not the subject of a monograph in either of the above reference books use:
 - (a) The accepted scientific name. If an organic chemical, the positions of characteristic groups should be given to indicate the correct nature of the substance. A chemical formula is not an accepted form of disclosure.

- (b) If there is no definite scientific name the substance, active constituent or ingredient must be described in terms which make its nature clear.

Where an ingredient undergoes a process of extraction during manufacture and part of the material is rejected the statement would be, e.g., for capsicum fruit in a spirituous liniment:—The alcohol soluble constituents of "x" capsicum fruit, together with —(name the rest of the ingredients in the manner described above), "x" being an amount stated as a weight or a percentage.

2. *When poisons are present*, the poisons must be named in accordance with the requirements of the Pharmacy and Poisons Act, 1933, and the Rules made under that Act (see above).

Method of Stating Percentages or Quantities

1. *If no poisons are present*

- (1) *Fluid preparations, bulk powders, ointments, etc.*

The most convenient method will be to state the percentage of each active constituent or ingredient. If actual weights and measures are used different labels will be needed for each size packed, as the information must give the amount in each container.

- (2) *Tablets, lozenges, cachets, etc.*

The normal method will be to state the actual weights of active constituents or ingredients in each.

2. *If poisons are present*. No special method is prescribed for the disclosure of the approximate percentage or approximate quantity of a constituent or ingredient which is a poison. A disclosure in accordance with the requirements of the Pharmacy and Poisons Act, 1933, and the Rules made under that Act of the proportion of poison present (see above) will, however, be sufficient.

3. *Biological Products*. For many biological products it is usually impracticable to disclose the proportion of the active constituents present in terms of "approximate percentages" or "approximate quantities." For any such substances which are controlled either by the Pharmacy and Poisons Act, 1933 (e.g., the active principles of thyroid gland), or by the Therapeutic Substances Act, 1925 (e.g., sera and vaccines), it is suggested that compliance with the labelling requirements imposed under these respective enactments should be regarded as sufficient for the purposes of the Pharmacy and Medicines Act, 1941. Comparable methods of labelling in terms of international units or other accepted standards may also be adopted for any other substances, such as the vitamins, which are not controlled either under the Pharmacy and Poisons Act, 1933, or the Therapeutic Substances Act, 1925.

Restriction of Sale of Medicines by Unauthorised Persons

With specific exceptions, the Pharmacy and Medicines Act, 1941, prohibits the sale by retail of any article recommended as a medicine except by an authorised person. Authorised persons consist of the following three classes:—

1. Registered medical practitioners or registered dentists; or
2. Authorised sellers of poisons (from premises where the business is controlled by a pharmacist); or
3. Persons who (1) have served a regular apprenticeship to pharmacy; and (2) who, at the date of the passing of the Act, are carrying on on their own account a business which comprises the retail sale of drugs.

A person included in the third class is entitled to sell medicines only at a shop, and the business carried on at that shop, so far as it comprises

the retail sale of drugs, must be under the personal control of the person concerned.

The sale of the following three classes of medicines is not restricted to authorised persons, provided that the sale is effected at a shop:

1. Vegetable drugs and mixtures of such drugs either with or without water.
2. Natural mineral waters and artificial imitations.
3. Proprietary medicines except such as are included in the B.P. or B.P.C. and which include in their titles words constituting or forming a part of the description set out at the head of the monograph in the B.P. or B.P.C. as the case may be.

THE DANGEROUS DRUGS ACTS

The Act of 1920, known as the principal Act, regulates the importation, exportation, manufacture, sale and use of opium and other dangerous drugs and is amended in certain respects by the Acts of 1923, 1925 and 1932.

The four parts of the principal Act deal respectively with (i) raw materials, (ii) opium for smoking, (iii) those drugs used in medicine and (iv) the administrative provisions.

In the following summary only Part III is dealt with as the remainder do not affect the dispensing chemist. This part prescribes a list of drugs which may only be imported or exported under special licence granted by the Secretary of State who, under Section 7 of the principal Act, made the Dangerous Drugs Regulations 1937 governing the manufacture, sale, possession and distribution of the drugs.

Unless otherwise required by the context, the expression "the Regulations" in this summary means the Regulations which apply to drugs (other than the exempted drugs and preparations) included in Part III of the principal Act and "the drugs" means the drugs (other than the exempted drugs and preparations) to which Part III of the principal Act applies.

The Controlled Drugs

The Regulations apply to the following drugs:—

- (1) medicinal opium;
- (2) any extract or tincture of Indian hemp;
- (3) morphine and its salts, and diacetylmorphine (commonly known as diamorphine or heroin) and the other esters of morphine and their respective salts;
- (4) cocaine (including synthetic cocaine) and ecgonine and their respective salts, and the esters of ecgonine and their respective salts;
- (5) any solution or dilution of morphine or cocaine or their salts in an inert substance* (see page 213) whether liquid or solid, containing any proportion of morphine or cocaine, and any preparation, admixture, extract or other substance (not being such a solution or dilution as aforesaid) containing not less than one-fifth per cent. of morphine or one-tenth per cent. of cocaine;

- (6) any preparation, admixture, extract or other substance containing any proportion of diacetylmorphine, or of the other esters of morphine, and any preparation, admixture, extract or other substance containing any proportion of ecgonine or of the esters of ecgonine or of the respective salts of the esters;
- (7) dihydrohydroxycodine, dihydrocodeinone, dihydromorphine, acetyldihydrocodeinone, dihydromorphine, their esters and the salts of any of these substances and of their esters, morphine-N-oxide (commonly known as genomorphine), the morphine-N-oxide derivatives, and any other pentavalent nitrogen morphine derivatives;
- (8) thebaine and its salts, and benzylmorphine and the other ethers of morphine and their respective salts;†
- (9) any preparation, admixture, extract or other substance containing any proportion of any of the substances mentioned in paragraph (7) or in paragraph (8) except in the case of preparations of methylmorphine or ethylmorphine, Syrupus Codeinæ Phosphatis B.P.C. 1934, and preparations, admixtures or other substances containing not more than 2·5 per cent. of methylmorphine or ethylmorphine (calculated as pure drug) associated with other medicinal substances.

For the purpose of the foregoing provision the expression "ecgonine" means lævo-ecgonine and includes any derivatives of ecgonine from which it may be recovered industrially, and the percentage‡ in the case of morphine shall be calculated as in respect of anhydrous morphine.

Exemptions

Substances which are exempt from control may be exempt under either of the following headings:—

- (1) In consequence of a decision of the League of Nations, the provisions of the International Opium Convention signed at Geneva ceased to apply to a number of drugs and preparations, which have subsequently been exempted from *all* control under the Dangerous Drugs Acts and Regulations—so far as this country is concerned—by an Order in Council. A full

* In reply to a question the Home Secretary has indicated that the following are not solutions or dilutions of morphine or cocaine or their salts in an inert substance.

- (1) A dilution of Tincture of Opium B.P., 1 part, with distilled water, 7 parts.
- (2) Pastilles, containing cocaine hydrochloride, 0·05 per cent., in a basis of glycerin and gelatin.
- (3) A dilution of Solution of Morphine Hydrochloride B.P. in either Chloroform Water B.P. or Peppermint Water B.P. (to contain less than 0·2 per cent. of morphine).

† Methylmorphine and ethylmorphine, their respective salts and preparations controlled by Part III of the principal Act are exempt from the requirements of the Dangerous Drugs Regulations, 1937 (see Exemptions, page 218). Methylmorphine and ethylmorphine and their respective salts are subject to special regulations which do not affect the dispensing chemist except in so far as they prohibit (except under licence) manufacture, supply by wholesale and possession of a drug in a quantity exceeding one pound avoirdupois.

‡ *Percentage*.—Section 5 of the Dangerous Drugs and Poisons (Amendment) Act, 1923, provides that, unless otherwise required by regulation, in the case of liquid preparations, percentages shall be calculated on the basis that a preparation containing one per cent. of any substance means a preparation in which one gramme of the substance if a solid, or one millilitre of the substance if a liquid, is contained in every one hundred millilitres of the preparation and so in proportion for any greater or less percentage.

list of the substances thus exempted is given in the "Schedule" below. There are only three preparations* included in the B.P. 1932 or B.P.C. 1934 which are exempted by this method and which are not also exempted under (2) below.

- (2) A number of preparations is exempt from control under the Dangerous Drugs Regulations, 1937, by inclusion in the Fourth Schedule to the Regulations (see below). These preparations are exempt from control under the Regulations, but their import and export are controlled by the principal Act.

SCHEDULE

(a) MORPHINE PREPARATIONS

1. <i>Cereoli iodoformi et morphine.</i>	Iodoform	In 1 bougie
	Morphine hydrochloride	0.320 grammes
	Oil of theobroma, sufficient to fill a 1-gramme mould.	0.016 "
2. <i>Emplastrum opii.</i>	Elemi	20 grammes
	<i>Terebinthina</i>	30 "
	<i>Cera flava</i>	15 "
	<i>Olibanum pulvis</i>	18 "
	<i>Benzoes pulvis</i>	10 "
	<i>Opii pulvis</i>	5 "
	<i>Balsamum peruvianum</i>	2 "
3. <i>Emplastrum opii.</i>	Extract of opium	25 grammes
	Refined elemi	25 "
	Diachylon plaster with gum	50 "
4. <i>Emplastrum opii.</i>	Elemi	8 grammes
	<i>Terebinthina communis</i>	15 "
	<i>Cera flava</i>	5 "
	<i>Olibani pulverata</i>	8 "
	<i>Benzoes pulverata</i>	4 "
	<i>Opii pulverati</i>	2 "
	<i>Balsami peruviani</i>	1 gramme
5. <i>Emplastrum opii.</i>	Opium, in very fine powder	10 grammes
	Resin plaster	90 "
6. <i>Emplastrum opii</i> (see formula under 5) mixed with other plasters contained in the British Pharmacopœia or British Pharmaceutical Codex.		
7. <i>Linimentum opii.</i>	Tincture of opium	500 millilitres
	Liniment of soap	500 "
8. <i>Linimentum opii</i> (see formula under 7) mixed with any other liniment of the British Pharmacopœia or of the British Pharmaceutical Codex.		
9. <i>Linimentum opii ammoniatum.</i>	Ammoniated liniment of camphor	30
	Tincture of opium	30
	Liniment of belladonna	5
	Strong solution of ammonia	5
	Liniment of soap	to 100
10. <i>Linimentum opii ammoniatum</i> (see formula under 9) mixed with any other liniment of the British Pharmacopœia or British Pharmaceutical Codex.		
11. <i>Caustic "Nerve Pastes."</i>	Preparations containing, in addition to morphine salts, or morphine and cocaine salts, at least 25 per cent. of arsenious acid, and made up with the requisite proportion of creosote or phenol to produce the consistency of a paste.	

* *Pilula Plumbi cum Opio* B.P.C.
Fulvis Kino Compositus B.P.C.
Unguentum Gallic cum Opio B.P.C. alone and mixed with other ointments and plasters contained in the B.P. or B.P.C.

12. <i>Diarrhoea pills.</i>	Camphor	0.0648 gramme
	Lead acetate	0.013 "
	Bismuth subnitrate	0.162 "
	Tannic acid	0.0648 "
	Opium powder	0.026 "
13. <i>Pilula digitalis et Opii compositae.</i>	Digitalis leaves, in powder	0.31 gramme
	Opium in powder	0.19 "
	Ipecacuanha root, in powder	0.13 "
	Quinine sulphate	0.78 "
	Syrup of glucose, a sufficient quantity to make 12 pills.	
14. <i>Pilula hydrargyri cum Opio.</i>	Mercury pill	3.89 grammes
	Opium, in powder	0.19 gramme
	To make 12 pills.	
15. <i>Pilula hydrargyri cum Creta et Opii.</i>	Mercury with chalk	0.78 gramme
	Compound powder of ipecacuanha*	0.78 "
	Milk sugar, a sufficient quantity.	
	Syrup of glucose, a sufficient quantity.	
	To make 12 pills.	
16. <i>Pilula ipecacuanhae cum Scilla.</i>	Compound powder of ipecacuanha*	30 grammes
	Squill, in powder	10 "
	Ammoniacum in powder	10 "
	Syrup of glucose, a sufficient quantity.	
17. <i>Pilula hydrargyri bichlorati cum Opii extracto.</i>	Bichloride of mercury triturated	10 centigrammes
	Extract of opium	20 "
	Extract of couch-grass	20 "
	Liquorice root in powder, q.s. for 10 pills.	
18. <i>Pilula hydrargyri iodati cum Opii pulvere.</i>	Hydrargyrum iodatum freshly prepared	50 centigrammes
	Opium powder	20 "
	Powdered liquorice	30 "
	White honey, q.s. for 10 pills.	
19. <i>Pilula plumbi, cum Opio.</i>	Lead acetate, in powder	80 grammes
	Opium, in powder	12 "
	Syrup of glucose	8 "
	(or a sufficient quantity).	
20. <i>Pilula terebinthinae compositae.</i>	Opium	0.5 gramme
	Chinini sulfas	2 grammes
	Styrax liquidus	2 "
	Terebinthina larinina	8 "
	Magnesi subcarbonas, a sufficient quantity to make 100 pills.	
21. <i>Pulvis ipecacuanhae compositus</i> Syn: <i>Pulvis ipecacuanhae et opii</i> (Dover's powder).	Ipecacuanha root, in powder	10 grammes
	Opium, in powder	10 "
	Potassium sulphate in powder	80 "
22. Mixtures of <i>Dover's powder</i> (see formula under 21) with mercury and chalk, aspirin, phenacetin, quinine and its salts, and sodium bicarbonate.		
23. <i>Pulvis kino compositus.</i>	Kino, in powder	75 grammes
	Opium, in powder	5 "
	Cinnamon bark, in powder	20 "
24. <i>Suppositoria plumbi composita.</i> Syn: <i>Suppositoria plumbi cum opio.</i>	Lead acetate, in powder	2.4 grammes
	Opium, in powder	0.8 gramme
	Oil of theobroma, a sufficient quantity for 12 suppositories, each weighing about 1 gramme.	
25. <i>Coryza Tablets No. 2.</i>	Powdered opium	0.0043 gramme
	Quinine sulph.	0.022 "
	Ammon. chlor.	0.022 "
	Camphor	0.022 "
	Ext. belladonna leaves	0.0043 "
	Ext. aconite root	0.0043 "

* The formula of this powder is given under 21, *Pulvis ipecacuanhae compositus*.

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|---|---|---------------|
| 26. <i>Diarrhoea Tablets No. 2.</i> | Powdered opium | 0.016 gramme |
| | Camphor | 0.016 " |
| | Powdered ipecacuanha | 0.008 " |
| | Lead acetate | 0.011 " |
| 27. <i>Dysentery Tablets.</i> | Powdered opium | 0.013 gramme |
| | Powdered ipecacuanha | 0.0648 " |
| | Powdered calomel | 0.0324 " |
| | Lead acetate | 0.0324 " |
| | Bismuth betanaphthol... .. | 0.1944 " |
| 28. <i>Tabella hydrargyri cum Opio.</i> | Mercurous chloride powder | 0.065 gramme |
| | Antimony oxide powder | 0.065 " |
| | Ipecacuanha-root powder | 0.065 " |
| | Powdered opium | 0.065 " |
| | Milk sugar | 0.065 " |
| | Gelatin solution, a sufficient quantity to make 1 tablet. | |
| 29. <i>Tabella plumbi cum Opio.</i> | Sugar of lead | 0.195 gramme |
| | Powdered opium | 0.065 " |
| | Gelatin solution, a sufficient quantity to make 1 tablet. | |
| 30. <i>Tablette plumbi cum Opio.</i> | Lead, acetate, in fine powder... .. | 19.44 grammes |
| | Opium, in powder | 3.24 " |
| | Refined sugar, in powder | 6.48 " |
| | Ethereal solution of theobroma | 3.60 mls |
| | Alcohol | 0.90 " |
| 31. <i>Unguentum galle compositum.</i> | Galls in very fine powder | 20 |
| | Extract of opium | 4 |
| | Distilled water | 16 |
| | Wool fat | 10 |
| | Soft paraffin, yellow | 50 |
| 32. <i>Unguentum galle compositum</i> (see formula under 31) mixed with other ointments and plasters contained in the British Pharmacopœia or British Pharmaceutical Codex. | | |
| 33. <i>Unguentum galle cum Opio.</i> | Gall ointment | 92.5 grammes |
| | Opium in powder | 7.5 " |
| 34. <i>Unguentum galle cum Opio</i> (see formula under 33) mixed with other ointments and plasters contained in the British Pharmacopœia or British Pharmaceutical Codex. | | |
| 35. <i>Yatren-105</i> (Iodo-oxyquinoline-sulphonic acid) with 5 per cent. opium admixture. | | |

(b) COCAINE PREPARATIONS.

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|---|---|-------------|
| 1. <i>Bernatzik's Injections.</i> | (a) <i>Hydrargyrum bichyanatum</i> | 0.03 gramme |
| | <i>Cocainum</i> | 0.02 " |
| | (b) <i>Hydrargyrum succinatum</i> | 0.03 " |
| | <i>Cocainum</i> | 0.01 " |
| 2. <i>Stila's Injections.</i> | (a) <i>Hydrargyrum succinatum</i> | 0.03 gramme |
| | <i>Cocainum muriaticum</i> | 0.01 " |
| | (b) <i>Hydrargyrum succinatum</i> | 0.05 " |
| | <i>Cocainum muriaticum</i> | 0.03 " |
| 3. <i>Natrium biboracicum compositum cum Cocaino.</i> | In tablets, compressed tablets, lozenges, pastilles and the like, difficult to break up, and containing not more than 0.2 per cent. of cocaine salts in conjunction with not less than 20 per cent. borax and not less than 20 per cent. antipyrine, or some similar analgesic, and not more than 40 per cent. of flavouring matter. Maximum weight of each tablet, etc., 1 gramme. | |
| 4. <i>Caustic "Nerve Pastes."</i> | Preparations containing, in addition to cocaine salts or cocaine and morphine salts, at least 25 per cent. of arsenious acid, and made up with the requisite proportion of creosote or phenol to produce the consistency of a paste. | |

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|---|--|
| 5. Cocaine and Atropine Tablets, with a content of not more than 0.0003 gramme of cocaine salts and not less than 0.0003 gramme of atropine salts to each tablet. | <i>Atropinum sulphuricum</i> ... 0.0003 gramme
<i>Cocainum hydrochloricum</i> ... 0.0003 "
<i>Mannite</i> ... 0.003 "
Weight of one tablet ... 0.0036 gramme
Cocaine content 8.3 per cent. |
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(c) HEROIN PREPARATIONS.

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| 1. <i>Elixir camphoræ compositum.</i> | Camphor ... 4 grains
Oil of anise ... 5 minims
Benzoic acid ... 6 grains
Diamorphine hydrochloride ... 4 "
Liquid extract of ipecacuanha ... 120 minims
Tincture of squill ... 1 1/2 fl. ounces
Simple syrup ... to 20 fl. ounces |
| 2. <i>Elixir diamorphinæ et Terpinæ, with Apomorphine.</i> | Apomorphine hydrochloride ... 5 grains
Diamorphine hydrochloride ... 4 "
Terpin hydrate ... 44 "
Alcohol ... 10 fl. ounces
Glycerin ... 5 "
Syrup of wild cherry ... to 20 " |
| 3. <i>Linctus diamorphinæ with Ipecacuanha.</i> | Liquid extract of ipecacuanha ... 120 minims
Diamorphine hydrochloride ... 4 grains
Tincture of hyoscyamus ... 1 1/2 fl. ounces
Spirit of chloroform ... 3 "
Syrup of balsam of tolu ... 3 "
Syrup of wild cherry ... 3 "
Glycerin ... to 20 " |
| 4. <i>Linctus senegæ compositus.</i> | Liquid extract of senega ... 1 fl. ounce
Liquid extract of squill ... 1 "
Tartarated antimony ... 8 grains
Diamorphine hydrochloride ... 4 "
Glycerin ... 2 fl. ounces
Simple syrup ... to 20 " |
| 5. <i>Linctus thymæ compositus.</i> | Diamorphine hydrochloride ... 4 grains
" phine hydrochloride ... 5 "
water ... 1 fl. ounce
extract of thyme 1-1 ... 5 fl. ounces
tution of tolu ... 1 1/2 "
Glycerin ... to 20 " |

(d) DICODIDE PREPARATIONS.

1. *Cardiazol-Dicodide Solutions.* Solutions containing not less than 10 per cent. of cardiazol and not more than 0.5 per cent. of dicodide salts.

(e) EUCODAL PREPARATIONS.

- | | |
|--------------------------------|--|
| 1. <i>Anti-Opium Tablets.*</i> | Eucodal ... 1 gramme
<i>Fulcis gentiana</i> ... 35 grammes
<i>Fulcis ipecacuanha</i> ... 20 "
Quinine sulphate ... 20 "
Caffeine... 5 "
Sugar of milk ... 25 "
Mix up and make up 5-grain tablets. |
| <i>Tablets B.B. Compound.</i> | <i>Berberis vulgaris</i> powder ... 0.0324 gramme
<i>Nux vomica</i> ... 0.013 "
Eucodal ... 0.0032 "
Ipecacuanha ... 0.0648 "
Rhubarb ... 0.013 "
<i>Fulcis cinnamomi compositus</i> ... 0.0324 "
Aromatic chalk... 0.0032 " |

* In exempting this preparation from the operation of the Geneva Convention, the Health Committee expressed the wish that it should not be offered to the public under the name of "anti-opium".

DRUGS AND PREPARATIONS EXEMPTED FROM CONTROL BY THE FOURTH SCHEDULE TO THE DANGEROUS DRUGS REGULATIONS, 1937.

Pasta Arsenicalis, B.P.C. 1934.
 Pil. Ipecac. c. Scilla, B.P.C. 1934.
 Pil. Digitalis et Opii Co., B.P.C. 1923.
 Pil. Hydrarg. c. Cret. et Opii, B.P.C. 1934.
 Pulv. Cretæ Aromat. c. Opio, B.P. 1932.
 Pulv. Ipecac. et Opii, B.P. 1932.
 Suppos. Plumbi c. Opio, B.P. 1932.
 Tabellæ Plumbi c. Opio, B.P.C. 1934.
 Elixir Diamorphinæ et Terpini c. Apomorphina, B.P.C. 1934.
 Linctus Diamorphinæ Camphoratus, B.P.C. 1923 and 1934.
 Linctus Diamorphinæ c. Ipecacuanha, B.P.C. 1934.
 Linctus Diamorphinæ et Scillæ, B.P.C. 1923 and 1934.
 Linctus Diamorphinæ et Thymi, B.P.C. 1923 and 1934.
 Mixtures of Pulv. Ipecac. et Opii, B.P. 1932 with any of the following:—
 Hydrarg. c. Cret., B.P. 1914 and 1932; Acetylsalicylic Acid; Phenacetin;
 Quinine and its salts; Sodium bicarbonate.
 Cocaine Eyedrops—a preparation consisting of an admixture of cocaine in castor oil with mercuric chloride in a proportion of not more than one part in 200 of cocaine and not less than one part in 3,000 of mercuric chloride.
 Methymorphine and ethymorphine and their respective salts and any preparation, admixture or other substance containing any proportion of methymorphine or ethymorphine associated with an inert substance whether solid or liquid; and preparations and admixtures or other substances containing more than 2.5 per cent. of methymorphine or ethymorphine (calculated as pure drug) associated with other medicinal substances.

Note.—In reply to an enquiry the Home Office have ruled that (1) a pill containing Pulv. Ipecac. et Opii combined with codeine and extracts of aconite and belladonna in such proportion that the percentage of anhydrous morphine is not under 0.2 per cent. is not exempt; (2) an ointment composed of equal parts of Ung. Gallæ c. Opio and Paraffinum Mollè is exempt on the ground that it is an addition of an inert substance.

Restrictions on Supply

Except on the prescription of a duly qualified medical practitioner, registered dentist, or registered veterinary surgeon, it is not permissible to supply to the public any of the drugs, except those preparations included under "Exemptions". Supplies on prescription may only be made if the conditions set out below are satisfied. The dispensing chemist may sell the drugs by retail to special classes of persons (see below). Similarly certain preparations may be sold by retail to the persons mentioned under "Special Authorisations".

Supplies other than on Prescription

A. Persons who may be supplied.

An authorised seller of poisons may in the ordinary course of business sell any of the drugs to any of the following "authorised persons" so far as may be necessary for the practice or exercise of their respective professions or employment in their capacity as members of their respective classes:—

- (1) duly qualified medical practitioners;
- (2) registered dentists;
- (3) registered veterinary surgeons;
- (4) pharmacists who are employed or engaged in dispensing medicines at a public hospital or other public institution;
- (5) persons who are in charge of a laboratory used for purposes of research or instruction and attached to a university, university college, public hospital or other institution approved for the purpose by the Secretary of State;

- (6) persons duly appointed by a local authority as analysts of articles of food and drugs under section 15 of the Food and Drugs (Adulteration) Act, 1928;
- (7) persons acting as sampling officers under the Food and Drugs (Adulteration) Act, 1928;
- (8) persons duly appointed by the Pharmaceutical Society of Great Britain as inspectors under section 25 of the Pharmacy and Poisons Act, 1933;
- (9) persons who are employed or engaged in connection with a scheme, for testing the quality and amount of the drugs and appliances supplied to insured persons under the National Health Insurance Acts, 1936 and 1937, and the Regulations made thereunder.

It should be noted that the Home Secretary has power to withdraw the authority of any person authorised by the Regulations to be in possession of or to supply the drugs, and pharmacists may not supply such persons with the drugs.

B. General conditions of supply.

Before supplying any of the persons mentioned above the pharmacist must

- (1) satisfy himself that the drugs are required for the practice or exercise of the profession or employment of the "authorised person";
- (2) secure that the appropriate records are made in the Poisons Book and obtain the signature of the purchaser thereto;
- (3) keep a record of the transaction as shown on page 223;
- (4) label the container with the amount of the drug supplied, or if a preparation of a drug is supplied (a) in the case of a powder, solution, or ointment with the total amount of the preparation in the container and the percentage of the drug present, and (b) in the case of tablets or other similar articles with the amount of the drug in each article and the number of articles in the container;
- (5) label the container in accordance with the requirements of the Pharmacy and Poisons Act, 1933, and the Poisons Rules, 1935.

C. Special conditions of supply to the authorised persons belonging to the classes (1), (2), (3), (4) and (5) under A above.

- (1) The conditions set out in (1), (3), (4) and (5) under B above must be satisfied, but as an alternative to (2) above the pharmacist may supply the drugs if before the sale (or in the case of emergency within twenty-four hours next following the sale) he receives an order in writing signed by the purchaser stating his name and address, trade, business or profession, the name and quantity of the article purchased and the purpose for which it is required. The pharmacist must be reasonably satisfied that the signature is that of the person purporting to have signed the order, and that that person carries on the trade, business or profession stated in the order.
- (2) If the purchaser represents that he urgently requires the drug for the purposes of his trade, business or profession the

pharmacist may send the drug to the purchaser on receiving an undertaking from the purchaser to furnish a signed order within the next twenty-four hours. If any purchaser by whom any such undertaking has been given fails to deliver to the seller the signed order in accordance with the undertaking or if any person for the purpose of obtaining delivery of any poison makes a statement which is to his knowledge false, he is deemed to have contravened the provisions of the Poisons Rules.

- (3) The pharmacist himself must make the usual entry in the Poisons Book except that it need not be signed by the purchaser and he must insert the words "signed order" and a reference number by which the order can be identified. He must preserve the order for a period of two years from the date on which the entry is made in the book. If the article sold is sent by post it must be sent by registered post.

Special Authorisations

A pharmacist may sell the particular preparation or preparations specified in each case to the following classes of persons:—

- A. *The Master of a British or Foreign Ship.*—*Any Drug or Preparation.*—To (i) The Master of a merchant ship not carrying a ship's surgeon such quantities of drugs as are necessary to comply with the requirements of the Merchant Shipping Acts; (ii) The Master of a foreign ship in any port in Great Britain is authorised to purchase and be in possession of such quantities of the drugs as are certified on a certificate from the Medical Officer of Health of the Port (or in his absence his Assistant), to be necessary for the equipment of the ship until it next reaches its home port. The certificate must be marked by the supplier with the date of the supply and be retained by him, and kept available for inspection.

- B. *Farmers and Stock-owners.*—*Tincture of Opium (Laudanum).*—Laudanum for use solely in the treatment of animals may be sold to farmers and stock-owners who hold a certificate of authorisation from the chief officer of police for the area in which they carry on business. Conditions regulating sale and possession appear on the certificate. The Poisons Book must be signed by the farmer.

FORM OF CERTIFICATE AUTHORISING FARMERS AND STOCKOWNERS TO PURCHASE TINCTURE OF OPIUM, B.P. COMMONLY KNOWN AS LAUDANUM FOR ADMINISTRATION TO ANIMALS.

I hereby certify that
 of
 is a person carrying on the business of a farmer or stockowner and is authorised in pursuance of Regulation 13 (4) of the Dangerous Drugs Regulations, 1937, to be in possession of tincture of opium, B.P. commonly known as laudanum, subject to the following conditions:—

- (a) He shall not have in his possession at any one time more than 32 ozs.
 (b) He may only purchase from the person named on the back hereof.
 (c) He must produce this certificate on the occasion of each purchase to the person supplying him, and the person supplying must enter on back of the certificate,

† Insert full name and address.

- at the time of purchase, the date of purchase and the quantity purchased, and attach his signature thereto.
- (d) The tincture of opium shall be kept by him or his responsible manager under lock and key and shall only be issued to responsible persons in his employment and only for the purpose of administration to animals. Each bottle or vessel containing the tincture shall be labelled with the words "For administration to animals only."
- (e) He must produce this certificate for inspection when required by any constable or by any person authorised for the purpose by the Secretary of State, and must furnish the Secretary of State with such particulars of his purchases as may be required.
- (f) This certificate is valid only for the person and in respect of the address which is named herein. If he ceases to carry on business at the address named he must return the certificate immediately to the Chief Officer of Police, and if a certificate is desired in respect of another address, must make application to him for such certificate.
- (g) This certificate shall continue in force until revoked by the Chief Officer of Police or by the Secretary of State, and on revocation shall be surrendered to the Chief Officer of Police.

Signed on behalf of the Chief Officer of Police.

.....
 Rank.
 Police Force.

Date.....

BACK OF FORM.

Name and address of person from whom the holder intends to purchase

TINCTURE OF OPIUM.
 (To be filled in by the holder.)

Name (in full)
 Address

If the holder desires to change the chemist from whom he purchases he must surrender this certificate to the Chief Officer of Police so that a new one may be issued in its stead.
 To be filled in by the supplier on the occasion of any purchase by the holder.

Date of Purchase.	Quantity Purchased.	Signature of Supplier.
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When this certificate is filled up the holder should return it to the Chief Officer of Police and make application for a new one.

C. Certified Practising Midwives.—Preparations containing Opium.—

Certified midwives who have in accordance with the provisions of the Midwives Act, 1902, or the Midwives (Scotland) Act, 1915, notified to the local supervising authority their intention to practise are authorised to be in possession of preparations containing opium so far as is necessary for the practice of their profession.

Supplies on Prescription

The Regulations apply to prescriptions which, when dispensed, result in the finished product being a drug.

It should be noted that there is nothing in the Regulations to prohibit the supply of a drug to a medical practitioner or dentist for his own treatment upon a prescription written by him. (See also "Supplies other than on Prescription".)

Prescriptions may only be written by duly qualified medical practitioners, registered dentists, or registered veterinary surgeons, and must comply with the following requirements:—

The prescription must—

- (1) be in writing (which includes typewriting);
- (2) be signed by the person giving it with his usual signature and dated by him;
- (3) except in the case of a health prescription*, specify the address of the prescriber;
- (4) specify the name and address of the person for whose treatment it is given, or if it is given by a veterinary surgeon, of the person to whom the article prescribed is to be delivered;
- (5) have written thereon, if given by a dentist, the words "For local dental treatment only" and, if given by a veterinary surgeon, the words "For Animal Treatment Only";
- (6) specify the total amount of the drug to be supplied.†

If a prescription expressly states that it may, subject to the lapse of a specified interval or specified intervals, be dispensed a second or third time, the medicament may be supplied a second or third time after the specified interval or intervals. Unless the prescriber so direct the prescription is to be dispensed once only. Except in the case of health prescriptions,* the prescription must be retained by the pharmacist.

All prescriptions must be marked at the time of dispensing with the date, or dates, on which they are dispensed, and the appropriate records made as shown on page 223.

When prescriptions written by a veterinary surgeon or dentist are dispensed, the container must be marked in accordance with instructions set out under B *General Conditions of supply above*. *This procedure is not to be adopted for physicians' prescriptions.*

Health prescriptions should be written on the ordinary health prescription form. The usual procedure as to despatch for pricing should be followed.

Records

Entries of all supplies of the drugs given on pages 212–13 received by the pharmacist must be made in a special Register on the day of receipt, or if that is not reasonably practicable, on the next day. The entries must be made in ink or otherwise so as to be indelible. Entries must not be cancelled, altered, or obliterated. Any correction must be made by means of a marginal note or footnote, and the date on which the correction was made must be specified. Separate parts of the

* A "health prescription" means a prescription given by a duly qualified medical practitioner under and in accordance with the Acts relating to National Health Insurance or given by a duly qualified medical practitioner upon a form issued by a local authority for use in connection with a health service of that authority.

† When a preparation which is contained in the British Pharmacopœia, the British Pharmaceutical Codex, or the Drug Tariff is supplied either alone or combined with another preparation contained in one of these books, it is sufficient to state the total amount of the preparation to be supplied.

Register must be kept for each of the following classes of drugs and preparations:—

- (1) Medicinal Opium;
- (2) Extracts or Tinctures of Indian Hemp;
- (3) Morphine and preparations containing it;
- (4) Diamorphine and preparations containing it;
- (5) Cocaine and Ecgonine and preparations containing them;
- (6) Dihydrohydroxycodineone and preparations containing it;
- (7) Dihydrocodeinone and preparations containing it;
- (8) Dihydromorphinone and preparations containing it.

In the absence from the Regulations of specific directions concerning the drugs mentioned on pages 212-13, but not included in the headings (1) to (8) inclusive above, pharmacists are advised to keep separate parts of the register to record any dealings they may have in them.

A. Drugs received.

The entries must be made in the following manner:—

Date on which supply received.	Name.	Address.	Amount obtained.	Form in which obtained.
	of person or firm from whom obtained.			

B. Drugs supplied.

The entries must be made in the following manner:—

Date on which the transaction was effected.	Name.	Address.	Authority of person or firm supplied to be in possession.	Amount supplied.	Form in which supplied.
	of person or firm supplied.				

The following procedure may be adopted, as an alternative, for recording sales and supplies:—Enter in a separate book, under their appropriate dates, all references to all such entries in the Prescription Book and Poisons Book as apply to the drugs. If this method is adopted the reference book must contain separate sections for each drug. The register or registers must be kept in some part of the premises to which it or they relate, and must be at all times available for inspection.

When the drugs are dispensed, an entry must also be made in the

Prescription Book as required by section 19 of the Pharmacy and Poisons Act, 1933, except in the case of health prescriptions, and where a pharmacist carries on business at more than one set of premises he must keep a separate register or registers in respect of each set of premises.

Information respecting his transactions in, and purchases and stocks of the drugs must be furnished by the pharmacist if required by or on behalf of the Home Office.

Storage

The pharmacist must store the drugs in a locked receptacle which can be opened only by him or by an assistant of his who is a pharmacist.

Postal Transmission of the Drugs

Under the Convention of Madrid, which came into force on January 1, 1922, "it is forbidden to send by post opium, morphine, cocaine, and other drugs." But this prohibition applies to Letter Post only. When the drugs are intended for legitimate medicinal purposes they may be sent by foreign Insured Box or Parcel Post, provided that the country of destination permits their importation. The restrictions applying to letter post are not imposed on the Inland Postal Service, provided that both wholesalers and retailers conform to all the Regulations under the Dangerous Drugs Acts.

Manufacture

No person may manufacture or carry on any process in the manufacture of the drugs given on pages 212-3 (including methyilmorphine, ethylmorphine or their respective salts), unless he is licensed by the Home Secretary to do so, and otherwise than in accordance with the terms and conditions of his licence. A person who is an authorised seller of poisons may manufacture at his registered premises *in the ordinary course of his retail business* any extract or tincture of Indian hemp, and any preparations of the drugs.

Preservation of Documents

The records and registers prescribed by the Regulations must be preserved for not less than two years from the date of the last entry in the record or register. Except in the case of "health prescriptions", a prescription or other document must be kept for not less than two years from the date on which it was issued or made.

Delivery to Messengers

If any person licensed or authorised to be in possession of the drugs (e.g., a doctor, dentist, veterinary surgeon, another pharmacist or a licence-holder) sends to a pharmacist for a supply of any of the drugs a messenger who is not authorised to be in possession, the drugs may only be delivered to the messenger if he produces a signed authority from the licensed or authorised person, and the pharmacist is satisfied that the authority is genuine. This requirement does not apply when the person authorised to be in possession is authorised by being supplied by a duly qualified medical practitioner or on the prescription of such a practitioner.

Hospitals and Institutions

In a special Order dated August 9, 1924, the Home Secretary exempted hospitals, infirmaries, asylums, poor law institutions or sanatoria,

supported by any public authority or out of any public funds or by a charity or voluntary subscriptions, from the operation of the Regulations, provided that certain specified conditions were complied with, the main points of which are:—

I. *Hospitals with Qualified Dispensers.*

In Hospitals, etc., in which the drugs are dispensed by a duly qualified medical practitioner or pharmacist or (in the case of a Poor Law Institution) by a dispenser whose appointment has been approved by the Minister of Health, the following conditions must be observed:—

- (1) Supplies.—All orders for supplies of drugs must be in writing signed by one of the medical practitioners attached to the hospital, or by the dispenser if he is a pharmacist. The person responsible for dispensing medicines must receive and have charge of all supplies of the drugs, and must enter in the drug ledger particulars of all supplies received, as shown on page 223. A separate record must be kept in respect of each of the drugs. *It should be noted that in reply to an enquiry, the Home Office stated that the hospital pharmacist's authority to be in possession of, and to supply the drugs is limited to the practice of his employment as a dispenser to the hospital, and does not cover the supply (by sale or otherwise) of drugs to members of the medical staff for use in their private practice.*
- (2) Dispensing Prescriptions.—The drugs or medicines containing them may only be dispensed for the use of the individual patient, and in accordance with the prescription of the medical practitioner in charge of the patient. The prescription (which may be on the patient's bed-card or case-sheet) must be in writing, dated, and signed or initialled by the doctor and must state either the name of the patient or the number of the case. A fresh prescription must be given whenever a fresh supply of the drug or medicine is required to be dispensed.
- (3) Records.—The dispenser must at the time of dispensing, stamp or mark the prescription to show that it has been dispensed, and must keep a complete record of all cases in which any of the drugs have been dispensed (giving date, name of prescriber, and name of patient or number of case). A separate record for each drug is necessary. Records of preparations falling outside the scope of the Acts need not be kept. Prescriptions must be kept for at least two years. Stock preparations of the drugs for the wards or out-patients' department may only be supplied on the written requisition of the sister-in-charge of the ward or out-patients' department. Such requisitions must be marked in the dispensary to show that they have been complied with, and must be filed.

II. *Hospitals with no Qualified Dispenser.*

Hospitals supported as above in which the dispenser is not a duly qualified medical practitioner, a pharmacist or a person whose appointment has been approved by the Minister of Health, are exempted from

the Regulations, provided that certain conditions are observed. These conditions are briefly as follows:—

- (1) All supplies of the drugs must be obtained by or on the written order of one of the medical practitioners attached to or attending the hospital, who must certify that the supply is necessary for the treatment of patients in the hospital.
- (2) Supplies must be received and kept under lock and key by the matron or acting matron, who is to be responsible for making the records of receipt. A separate record must be kept in respect of each of the drugs.
- (3) The drugs may be used or administered only by the matron or acting matron and in accordance with the directions of the medical practitioner at the hospital.
- (4) Except as modified above, the full regulations apply to the hospital.

Note.—Private Hospitals, Dispensaries, Nursing Homes, etc., conducted for profit or in any other way not covered by the provision of the above special Order are not authorised to be in possession of the drugs. Such drugs can only be supplied for the use of patients in these institutions in the same way as they can be supplied for the use of a patient in his own home, that is to say, there must be a separate prescription written by a doctor for each patient, and the prescription must be sent to an authorised seller of poisons to be dispensed.

THE THERAPEUTIC SUBSTANCES ACT, 1925

The Act provides for the control of the manufacture, sale and importation of certain substances, the purity or potency of which cannot be found with certainty by chemical means.

Scheduled Substances (as amended by the Therapeutic Substances Regulations, 1931–1937)

- (1) The substances commonly known as vaccines, sera, toxins, antitoxins and antigens.
- (2) The substance commonly known as salvarsan (dioxydiamino-arseno-benzol-di-hydrochloride) and analogous substances used for the specific treatment of infective disease.
- (3) Preparations of the specific antidiabetic principle of the pancreas, known as insulin.
- (4) Preparations of the posterior lobe of the pituitary body intended for use by injection.
- (5) Surgical ligature and sterilised surgical suture as defined in the Sixth Schedule to the Therapeutic Substances Regulations, 1931.

Control and Exemptions

Persons manufacturing or importing any of the scheduled items must be licensed and comply with any conditions specified in the licence. An exception is made in the case of a medical practitioner who desires to make a substance covered by the Regulations for the use of one of his patients provided it is prepared specifically for one individual patient. This permission may be delegated to another medical practitioner to

make the material on his behalf. The Act and Regulations do not apply to any substance intended to be used solely for veterinary purposes if the container is labelled "To be used solely for veterinary purposes".

Licensing Authorities

- (1) England and Wales—The Minister of Health.
- (2) Scotland—The Scottish Board of Health.
- (3) Northern Ireland—The Minister of Home Affairs.

The first and third of the above Ministers with the Secretary for Scotland form a Joint Committee which has an Advisory Committee, one member being appointed by each of the following:—

- The Minister of Health.
- The Scottish Board of Health.
- The Minister of Home Affairs for Northern Ireland.
- The Medical Research Council.
- The General Medical Council.
- The British Medical Association.
- The Council of The Pharmaceutical Society of Great Britain.
- The Council of the Royal Institute of Chemistry of Great Britain and Ireland.

Duties of Joint Committee

To make Regulations for the purposes specified in the Act. These now include forms of licences and applications for licences, conditions which may be attached to a licence, standards of strength, quality and purity of any Therapeutic Substance, units of standardisation, tests for determining standards of strength, type of container and labelling requirements. The full regulations are contained in the Therapeutic Substances Regulations, 1931, as amended in 1935 and 1937.

The regulation of chief concern to the pharmacist in retail business is the following:—

"No person shall sell any therapeutic substance after the date recorded on the container, label or wrapper, as the date up to which the substance may be expected to retain a potency not less than or not to acquire a toxicity greater than that required or permitted by the test, as the case may be:—

Provided that a person may, at the request of a registered medical practitioner, sell after the date aforesaid any therapeutic substance (except such as are required to be tested for maximum toxicity) which loses its potency, if he has previously drawn the practitioner's attention to the dates recorded on the container, label or wrapper, and the practitioner is satisfied that the sale is required by the urgency of the case."

Research

An application for a special licence to import therapeutic substances for the purpose of scientific research must be supported by the recommendation of persons holding certain offices.

THE SALE OF FOOD AND DRUGS

The Foods and Drugs Act 1938, consolidates a series of Statutes providing for the sale of food and drugs in a pure state.

The following summary contains only such provisions as relate to the sale of drugs and medicines, the powers and duties of local authorities and the rights and responsibilities of pharmacists.

Definition of "Drug"

Medicines for internal and external use are included under the heading of drugs and although drug standards are not set out in the Act it is clear from decisions which have been given that an offence is committed if a substance of British Pharmacopœia standard is not supplied in response to a request for an article asked for by one of the official names.

In cases where no standard exists a Court will make its decision on the evidence placed before it. The deciding factor would be whether the drug was supplied for use as a medicine.

Offences

The wilful and deliberate adulteration of drugs is subject on conviction to a fine not exceeding £20 for the first offence; subsequent offences are punishable by fine or imprisonment. It is an offence to add, or direct any other person to add any substance to any drug which will injuriously affect the quality or potency of the drug, with intent that the same shall be sold in such state. It is equally an offence to sell such drug.

Proceedings are usually taken under Section 3 of the Act, which makes it an offence to sell to the prejudice of the purchaser any drug which is not of the nature, substance and quality of the article demanded. It is not necessary for the prosecution to prove that the article supplied was injurious to health.

A seller is responsible even for the unauthorised acts of his servant or agent, and it is no defence for him to plead ignorance of the fact that the article was defective. It is for the prosecution to establish that there is a standard to which the article sold should conform.

Defences

No offence is committed

- (a) if any matter or ingredient not injurious to health has been added because it is required for the preparation of the drug as an article of commerce, and not fraudulently to increase the bulk, weight, or measure, or conceal inferior quality, or
- (b) where the article demanded is a proprietary medicine or is the subject of a patent; or
- (c) where the drug is unavoidably mixed with some extraneous matter in the process of collection or preparation.

The purchaser is not prejudiced if he is made aware of the defect by, for example, a notice given him by the seller. But for this purpose the inspector is regarded as an ordinary member of the public, and any special knowledge he may have acquired in the course of his work may not be relied upon by the seller. Any notice appearing on the label or otherwise must be in terms which will clearly convey to an ordinary member of the public the difference between the article demanded and that actually supplied.

In the case of the sale of a drug mixed with any substance not injurious to health and not intended fraudulently to increase its bulk, weight or measure, or conceal its inferior quality, the seller is protected if he supplies to the purchaser a notice, by a label, to the effect that the drug is mixed.

The Warranty Defence

A defendant who is charged with any of the above offences is entitled to be acquitted if he proves to the satisfaction of the Court

- (a) that he purchased the article as the same in nature, substance and quality as that demanded of him by the prosecutor, and
with a written warranty to that effect, and
- (b) that he had no reason to believe at the time of sale that the article was otherwise, and
- (c) that he sold it in the same state as when he purchased it.

To avail himself of this defence the seller must within seven days of the receipt of his summons send a copy of the warranty to the prosecutor with a written notice that he intends to rely on it. He must furnish the name of the person who gave the warranty, to whom he must also send a like notice.

The legal rules which determine whether or not a document amounts to a warranty are somewhat complicated, and cannot be fully dealt with here, but the following points should be noticed:—

1. There must be *as a term of the contract of sale* between the trader and his wholesaler or other supplier, a stipulation by the former that a written warranty is to be supplied in respect of the goods bought.
2. The warranty may be contained in more than one document, as, for example, an invoice and a label; but there must be something in writing to connect the warranty with the particular consignment or article supplied.

It is advisable before entering upon a course of dealing with a supplier to stipulate that all orders will be given only on the understanding that a written warranty shall accompany all goods which are bought as conforming to the standard of the British Pharmacopoeia or other standard; and, in addition, to use written orders and upon each written order to place a like stipulation.

Administration

It is the duty of the Local Authority to administer the Act. Each Authority must appoint an analyst for the purpose, together with "sampling officers". The duties of the local authority include the institution of proceedings, but any private purchaser also has the liberty to take action.

Sampling

The appointed officers have the power to take samples at a shop or place of business and submit them for analysis.

Samples are purchased in the ordinary way of business and the officer can insist on being supplied with any drug exposed for sale, but he cannot compel the seller to break a bulk package if the article is normally sold in that form. When the sale is completed the officer must notify the seller that the sample has been taken under the Regulations of this Act.

Division of Sample

The material must there and then be divided into three separate parts and each part closed, marked and sealed. If several containers are bought the contents of all may be bulked and divided into the three parts or each individual packet can be so divided. One part is returned to the seller, two are taken away, one of which the officer retains, the other is sent to the analyst.

Obstruction

It is an offence to refuse the sale, to destroy the sample, to warn any person of the presence of the sampling officer or in any way to interfere with the execution of his duties.

Duties of the Analyst

On receipt of the prescribed fee the analyst must, as early as is practicable, analyse the sample submitted to him and supply a certificate in the prescribed form. An analysis need not be given if the sample is reported as genuine but if the contrary is the case the result of the analysis must be detailed. An expression of opinion alone in the latter case is not acceptable.

Should the sample be liable to decomposition it is necessary for the certificate to indicate that no change had occurred which would interfere with the analysis.

Proceedings

All proceedings under these Acts must be commenced within 28 days of the time of purchase. Cases under these Acts are tried before Courts of Summary Jurisdiction.

A copy of the certificate must be served with the summons, if proceedings are taken. The certificate of a public analyst is admissible in evidence on behalf of either the prosecution or defence, and the analyst himself need not be called as a witness unless the opposing party demands his attendance.

The third part of the sample must be produced at the hearing, and either party may require it to be sent to the Government Chemist for analysis.

ACTS AND REGULATIONS RELATING TO SPIRITS AND WINES**Sale of Intoxicating Liquor**

Control of sale is exercised partly by the Justices of the Peace in each area and partly by the Commissioners of Customs and Excise. To sell such liquor by retail it is necessary first to obtain a "Justice's licence" (Scotland—a licensing court certificate) and then to take out the appropriate excise licence. Separate licences from both authorities are required for spirits, beer, wine, sweets and cider.

Definition of Wine

The expression "wine" means imported wines, such as port, sherry, etc., and a liquor sold under the name of a foreign wine is taken to be a foreign wine. All other wines—the orange wine of the British Pharmacopœia 1914 for example—are classed as sweets, the definition of which is "any liquor which is made from fruit and sugar, or from

fruit or sugar mixed with any other material, and which has undergone a process of fermentation in the manufacture thereof, and includes British Wines, made wines, mead and metheglin".

Justices' Licences

No justices' licence is required to sell medicated (or methylated) spirits, or spirits made up in medicines and sold by medical practitioners or chemists and druggists. A justices' licence must be obtained by any pharmacist who desires to sell wines. The fact that the wine is sold for medicinal purposes is immaterial. A "wine" licence entitles the holder to sell both wines and "sweets"; a "sweets" licence does not entitle the holder to sell wine.

Different benches of magistrates may form varying opinions as to whether a given preparation is or is not a beverage, and no standard can be laid down.

In the case of a "medicated" wine the test would be whether the medicament was present in sufficient quantity to destroy the character of the wine as a beverage.

It has been decided by a bench of magistrates that a preparation consisting chiefly of port and containing 1·2 grains of quinine in each fluid ounce was a wine, and the High Court refused to interfere with the decision.

Excise Licences

There is no statutory exemption permitting pharmacists to sell wines or spirits for medicinal use without an excise licence.

In practice, however, the Commissioners of Customs and Excise do not require an excise licence to be taken out by a person or limited company for sales by retail of:—

- (1) medicated wines and sweets of the British Pharmacopœia;
- (2) other medicated wines and sweets or spirits containing a medicinal substance in such proportion as, in the opinion of the Commissioners, will give the wine or spirits a distinct medicinal character, and make them unsuitable or too unpalatable for use as a beverage. It is necessary that the directions as to dose, etc., on the label shall clearly indicate that the preparation is intended for use as a medicine and not for use as a beverage;
- (3) Rectified spirit in quantities not exceeding 5 ounces at one time for medical purposes or scientific research.

Spirits Rebate

Heavy duties are levied on all spirits. By the Finance Acts of 1918 and 1920 these duties are substantially reduced in the case of spirits used in the making of mixtures, substances or preparations recognised by the Commissioners of Customs and Excise as being used for medicinal purposes. Where duty-paid spirits are used for making such preparations, a rebate may be obtained provided that the Regulations of the Commissioners contained in the Spirits (Medical Purposes) Regulations, 1934, have been observed. These require *inter alia* the keeping of a stock book for spirits in which full and proper records must be made of all transactions in respect of which a claim for rebate is to be made. The claim must be made in the manner and within the time prescribed.

The Commissioners do not recognise for the purposes of the rebate those preparations which may be used for other than medical purposes. Thus toilet articles, perfumery, essences, flavouring agents, and some skin lotions, even if prescribed by doctors, are not subject to rebate. No list of recognised articles is issued to the public or the trade. In practice a chemist will as a rule be informed by the officers of the Customs and Excise whether any given article is recognised or not.

The Finance Act, 1934, makes it an offence for any person to use otherwise than for a medical or scientific purpose, an article manufactured or prepared from spirits on which a rebate of duty has been or is to be obtained, unless he has obtained the consent of the Commissioners of Customs and Excise, in writing, to the use of the article otherwise than for medical or scientific purposes and has refunded the rebate of duty.

Methylated Spirits

The Regulations governing the manufacture and sale of methylated spirits are the Methylated Spirits Regulations, 1930, as amended by the Methylated Spirits (Amendment) Regulations, 1934.

Methylated spirits are spirits which have been "methylated"—i.e., mixed with some substance so as to render the mixture unfit for use as a beverage—in such manner as is prescribed by the Commissioners of Customs and Excise.

Four classes of methylated spirits exist, *viz.*, power methylated spirits, industrial methylated spirits, industrial methylated spirits (pyridinised) and mineralised methylated spirits.

Of these four classes, only the two following are of particular interest to pharmacists and these only are dealt with here.

Industrial methylated spirits are spirits prepared for use in any art or manufacture. It contains 5 per cent. by volume of wood naphtha and, except as shown below, may not be sold by retail.

Mineralised methylated spirits are the ordinary methylated spirits of retail trade. They are prepared by adding to every 100 gallons of a mixture of spirits, containing $9\frac{1}{2}$ per cent. by volume of wood naphtha and $\frac{1}{2}$ per cent. of crude pyridine, three-eighths of a gallon of mineral naphtha or petroleum oil and not less than one-fortieth of an ounce by weight of powdered aniline dye (methyl violet).

Both spirits are exempt from the payment of spirit duty.

Mineralised and Industrial Methylated Spirits

No person other than a recognised methylator may prepare methylated spirits, and then only subject to the regulations of the Commissioners. Any other person who makes methylated spirits is liable to a penalty of £50.

It is an offence under the Spirits Act, 1880, to prepare or sell any methylated spirits as or for a beverage, or to use them in the preparation of any article capable of being used as a beverage, or internally as a medicine, or to sell or possess any such article. The Methylated Spirits Regulations, 1930, provide, however, that the prohibition relating to articles capable of being used internally as a medicine shall not apply to the making with industrial methylated spirits of any article, for external use only, sold or supplied on the prescription of a medical practitioner, dentist, or veterinary surgeon in accordance with the conditions below.

In the case of the death of an authorised user or retailer or on the discontinuance or transfer of his business, no methylated spirits may be disposed of without the sanction of the Commissioners.

The above provisions apply to both types of spirits.

Mineralised Methylated Spirits

PURCHASES. All mineralised methylated spirits bought by the licensed retailer must be obtained from an authorised methylator or from another retailer, and not more than 200 gallons may be held in stock.

LICENCES. Every retailer must obtain each year from the Commissioners of Customs and Excise a licence, at a cost of 10s., and notify the local officer of Customs and Excise of the premises he intends to use in connection with the storage and sale of the spirits.

RETAIL SALES. Only mineralised methylated spirits may be sold by retail for general use.

A retailer may not sell to another retailer or any other person, more than 4½ gallons at any one time, and no sales may be made between 10 p.m. on Saturday and 8 a.m. on Monday.

RECORDS. Retailers may be required to keep accounts in a prescribed form showing purchases and sales, but this requirement is not insisted upon except in special cases.

Industrial Methylated Spirits

LICENCES. Since the substances contained in mineralised methylated spirits render it unsuitable for certain medicinal purposes, the Methylated Spirits Regulations 1930, as amended in 1934, provide that a pharmacist who holds a methylated spirits licence may obtain a special authority from the Commissioners to hold stocks of industrial methylated spirits and to sell them as specified at (1) and (2) below.

USE. A person desiring to purchase industrial methylated spirits for use in any art or manufacture must obtain permission from the Commissioners and may be called upon to give security that he will use the spirits for the purpose for which permission has been given, and that he will observe the regulations prescribed for preventing their improper or unlawful use.

DISPENSING AND OTHER SUPPLIES. When applying for the special authority referred to above application may be made for an additional authority to receive this spirit for use in (a) dispensing; (b) the preparation of certain articles named in the Schedule to the Methylated Spirits (Amendment) Regulations 1934; (c) preparations in the N.P.U. Formulary or any other preparation for which special authority has been obtained.

The authority conveys the right to sell without restriction any articles coming under (b) or (c).

SUPPLY ON PRESCRIPTION. In the dispensing and subsequent sale of industrial methylated spirits or of articles not in the Schedule, the following conditions apply:

- (1) The articles, or the industrial methylated spirits, must only be dispensed on a prescription or order, dated and signed by a qualified medical practitioner, dentist or veterinary surgeon.
- (2) A prescription or order for industrial methylated spirits either diluted or undiluted:

- (a) must specify the quantity of industrial methylated spirits (undiluted or diluted) required;
 - (b) must not be acted upon more than once, or more than seven days after the date it bears;
 - (c) must, if not issued under the National Health Insurance Regulations, be retained by the dispensing chemist for two years.
- (3) When any article made with industrial methylated spirits on a prescription not issued under the National Health Insurance Regulations is dispensed, the prescription must be entered in a prescription book, with the name of the person for whom the prescription is written and of the person by whom it is signed. Prescriptions according to formulæ given in any recognised book of reference may be quoted by the recognised short title.
- (4) No greater quantity than one pint of industrial methylated spirits, either alone or diluted with water, or as an ingredient in any article, may be supplied at any one time to or for the use of any one person.
- (5) The bottles or other containers in which industrial methylated spirits are dispensed must be conspicuously labelled "For External Use Only," "Not To Be Taken," or otherwise to the same effect.

ANNUAL RETURNS. Every authorised user of industrial methylated spirits is required to make an annual return of the spirits used in accordance with his authority. The return must be in the prescribed form and furnished to the Commissioners of Customs and Excise on such date as they may direct.

Iso-Propyl Alcohol

In addition to imposing upon importers of iso-propyl alcohol further obligations to those required under the Customs Acts, the Iso-propyl Alcohol Regulations, 1927, apply to manufacturers, sellers and users of such alcohol.

Every manufacturer, seller and user must in respect of each half-year ending on June 30 and December 31 make a return on the form provided by the Commissioners of Customs and Excise, stating

- (1) in the case of a manufacturer, the total quantity of iso-propyl alcohol manufactured by him during that period;
- (2) in the case of a seller (whether or not also a manufacturer or user) particulars of each quantity of iso-propyl alcohol received and sold by him during the half-year period, the date of receipt or sale of each such quantity and the name and address of the person from whom it was received, or to whom it was sold;
- (3) in the case of a user (whether or not also a manufacturer or seller) particulars of the quantity and date of receipt of each consignment of iso-propyl alcohol received by him during the half-year period and the name and address of the person from whom it was received. In addition the purposes for which any iso-propyl alcohol has been used by him and the total quantity used for each purpose during the half-year period must be stated.

SCOTLAND

The Retailing of Mineralised Spirits and Surgical Spirit in Scotland.

Restrictions are imposed by the Methylated Spirits (Sale by Retail) (Scotland) Act, 1937, on the sale of mineralised methylated spirits and surgical spirit, in Scotland, which are additional to the restrictions already outlined above. A summary is given below of the provisions of the Act so far as they relate to pharmacists, bodies corporate and firms who are authorised sellers of poisons in Scotland.

I. Substances Controlled

The following substances are controlled by the Act:—

- (1) mineralised methylated spirits methylated in accordance with the regulations made by the Commissioners of Customs and Excise; and
- (2) any preparation made with industrial methylated spirits in accordance with a formula approved by the Commissioners of Customs and Excise for the manufacture of surgical spirit.

II. Transactions Affected

The Act controls all sales by retail, *i.e.*, all sales except:—

- (1) sales in quantities exceeding four gallons (*Note:* Under Excise Law it is an offence for a retailer to sell to or for the use of, any one person more than four gallons of mineralised methylated spirits at one time); and
- (2) sales to persons who buy for the purpose of selling again.

III. Qualifications of Sellers

Subject in the case of methylated spirits to the possession of the necessary excise licence, authorised sellers of poisons are entitled to make sales of methylated spirits or surgical spirit, but only on premises duly registered under Part I of the Pharmacy and Poisons Act, 1933 (referred to subsequently as "registered premises"). Customs and Excise officers are not permitted to grant or renew any Customs licence for the sale by retail of methylated spirits to authorised sellers of poisons unless they produce a statutory declaration that they are authorised sellers of poisons and that the premises for which the licence is sought are registered premises. The following is a form of statutory declaration which may be used for this purpose.

I, A. B., do solemnly and sincerely declare,
 that { the (insert name of body corporate or firm) is } authorised seller of
 { I am } ^{an} } poisons within the meaning of the Pharmacy and Poisons Act, 1933, and
 my } premises at }
 are duly registered under Part I of the Pharmacy and Poisons Act, 1933, and
 I make this solemn Declaration conscientiously believing the same to be true,
 and by virtue of the provisions of the Statutory Declarations Act, 1835.

(Signed) (Signature of pharmacist, or of secretary or director of
 body corporate, or of secretary or partner of firm.)

(Date) /

The above declaration may be made before a Justice of the Peace.

IV. Sales "Over the Counter"

The container must bear a label with the following particulars:—(1) The name of the seller; (2) the address of the premises on which the substance is sold; (3) the words "methylated spirits" or "surgical spirit", as the case may be.

The seller, prior to the delivery of the methylated spirits or surgical spirit, must make entries in a book kept for the purpose, in the form indicated below:—

Date of sale	Name and address of purchaser	Name and quantity of spirits supplied	Purpose for which stated by purchaser to be required	Signature of purchaser or where appropriate the words "Signed Order"
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It is an offence "knowingly" to sell by retail methylated spirits or surgical spirit to any person under the age of fourteen.

V. Sales on "Signed Orders"

The same labelling and age requirements must be observed as for "sales over the counter". The seller must, before delivery of the methylated spirits or surgical spirit, receive an order signed by the purchaser specifying (1) his address; (2) the quantity of the methylated spirits or surgical spirit to be purchased; (3) the purpose for which it is required. The seller must be reasonably satisfied that the signature on the order is the signature of the person purporting to sign it.

The seller must make the same records as required for sales over the counter, and must enter in the place reserved for the signature of the purchaser the words "signed order".

VI. Alternative Procedure for Surgical Spirit

The procedure described in the previous two paragraphs does not apply in the case of surgical spirit which is sold by an authorised seller of poisons on registered premises, provided the following procedure is carried out:—

- (1) The container must be distinctly labelled with the name and address of the person by whom it is supplied or dispensed.
- (2) The following particulars must be entered in a book which is used regularly, but not necessarily exclusively, for the purpose (*e.g.*, the prescription book). The entries must be made on the day on which the surgical spirit is supplied or dispensed, or if that is not reasonably practicable, on the next day.

Sales on the prescription of a duly-qualified medical practitioner, registered dentist, or registered veterinary surgeon.

- (i) The date dispensed.
- (ii) The quantity supplied.
- (iii) The name or initials, and if known, the address of the person giving the prescription.
- (iv) The name, and if known, the address of the person to whom the prescription was given.
- (v) The date on which the prescription was given.

Sales Without a Prescription.

- (i) The date supplied.
- (ii) The quantity supplied.
- (iii) The name of the person to whom supplied.

The requirements in regard to records need not be satisfied in the case of surgical spirit which is supplied on a National Health Insurance prescription. In the case of "repeat prescriptions" of surgical spirit it will be sufficient if, on the day on which the spirit is supplied or, if that is not reasonably practicable, on the day next following that day, there is entered in the record book the day on which the spirit is supplied, the quantity supplied, and a sufficient reference to an entry in the book duly recording the dispensing of the spirit on a previous occasion.

VII. General Requirements

The Act gives a police officer power at all reasonable times to enter any premises on which he has reason to believe methylated spirits or surgical spirit are sold or exposed for sale by retail, and to inspect any book required to be kept, *i.e.*, either the book set aside for recording sales or the prescription book. No time limit is specified for the preservation of records. There is no requirement to retain signed orders for inspection.

Any person who, by himself or through his servant or agent, makes sales in contravention of the provisions of the Act or who obstructs any police officer in the exercise of any power conferred on him by the Act shall be liable on summary conviction to a fine not exceeding ten pounds or to imprisonment for a period not exceeding sixty days.

THE USE OF STILLS

Chemists, who wish to use a still or retort must apply to the Commissioners of Customs and Excise for an annual licence, which costs 10s. This licence does not entitle the holder to use his still for the distillation or rectification of spirits. Exemption from payment of licence duty can be obtained in respect of certain small stills used solely for the distillation of water.

NATIONAL HEALTH INSURANCE

The original National Insurance Act of 1911 and amending Acts have been replaced by the National Health Insurance Acts of 1936-38.

Only those sections of the Act and Regulations which affect the supply to insured persons of drugs, medicines and appliances are within the scope of this summary. The Act applies to Scotland with certain modifications, the more important of which are indicated later.

Committees

Each county or county borough has three committees responsible for the administration of medical benefit to insured persons.

(1) **THE INSURANCE COMMITTEE.** This is composed of representatives of insured persons, doctors, members elected by the area authority and members appointed by the Ministry. No direct provision is made for the inclusion of a pharmacist, but the committee usually includes one amongst its members. It works in conjunction with:

(2) **THE PANEL COMMITTEE** appointed by medical practitioners on the panel, and separately with:

(3) **THE PHARMACEUTICAL COMMITTEE** appointed by persons on the panel for the supply of drugs, etc.

Consultation must take place between (1) and (2) on all general medical matters concerning the service.

In the same way (1) and (3) must confer on all similar pharmaceutical matters and arrange for adequate dispensing facilities as well as for the testing of drugs, etc., supplied as medical benefit. The Pharmaceutical Committee deals with all matters of a purely pharmaceutical nature and investigates any matters arising between pharmacists in relation to the efficiency of the service, if necessary, referring the matter to the Minister of Health.

Sub-Committees

Certain duties are given to three sub-committees formed from the main committees.

(A) **THE MEDICAL SERVICE SUB-COMMITTEE** consists of three doctors and three insured representatives respectively from the members of the Panel and Insurance Committees, with a neutral chairman, to deal with questions arising between doctors and insured persons.

(B) **THE PHARMACEUTICAL SERVICE SUB-COMMITTEE** is constituted in a similar way with pharmacists in place of doctors and has similar duties. It also investigates cases referred to them under the Testing Scheme for Drugs and Appliances.

(C) **THE JOINT SERVICES SUB-COMMITTEE** includes two members from (A) and (B) with two from the Insurance Committee who represent insured persons, together with a neutral chairman. Its duties are to consider matters referred to it by one of the other sub-committees where both doctor and pharmacist are involved.

Complaints

A pharmacist against whom a complaint has been made must be given notice of the complaint and an opportunity of appearing before the pharmaceutical sub-committee when the complaint is investigated. The proceedings are private and counsel or other paid advocate may not be engaged. The sub-committee reports to the Insurance Committee with a recommendation as to any action which should be taken.

The Insurance Committee submits a copy of the report and its decision to the Minister and to the persons concerned. The latter must be informed of their right of appeal to the Minister against the decision and of the Minister's power on such an appeal to award costs. The Insurance Committee may (1) recover from the pharmacist any expenses owing to his failure or neglect to comply with the terms of service; (2) make representations to the Minister that owing to such failure or neglect the conditions on which the money for defraying the cost of medical benefit is payable to the committee have not been fulfilled, and (3) may make representations that the continuance of the pharmacist on the panel would be prejudicial to the efficiency of the service.

The Supply of Drugs and Appliances

"Medical Benefit" includes treatment and attendance, together with the provision of drugs and medicines and such appliances as are prescribed by the Regulations.

The Insurance Committee must contract with any person who wishes and is able to supply drugs, medicines and appliances, and publish a list of contractors. The insured person has the right to free choice of his supplier.

Except in special circumstances for which provision is made in the Regulations the Insurance Committee is entitled to contract for the dispensing of medicines only with authorised sellers of poisons who undertake that all medicines supplied by them to insured persons shall be dispensed, either by or under the direct supervision of a registered pharmacist, or by a person who for three years immediately prior to December 16, 1911, acted as a dispenser to a duly qualified medical practitioner or a public institution.

In rural areas where an insured person lives more than a mile from the nearest pharmacist the Insurance Committee will decide whether he shall obtain his drugs, etc., from the doctor or from a pharmacy, subject to the right of the insured person to make his own decision.

The Drug Tariff

The Minister of Health prepares what is known as the "Drug Tariff" which forms part of the terms of service. (In Scotland this is prepared jointly by the Pharmaceutical Standing Committee and the Drug Accounts Committee and approved by the Department of Health.)

It includes:—

- (a) The prices on the basis of which payment for drugs and appliances ordinarily supplied is calculated;
- (b) the method of calculating the payment for drugs not included in the tariff;
- (c) dispensing or other fees payable in respect of the supply of drugs and appliances. (The words "or other" do not appear in the Scottish regulations.)
- (d) standards of quality for drugs and appliances ordinarily supplied.

Medical practitioners are entitled to order such "proper and sufficient" drugs, etc., as are required for the treatment of the patient; the pharmacist must supply, and will be paid for such drugs even though they are not specified in the tariff.

Conditions of the Contract

The pharmacist agrees with the Insurance Committee to comply with the "Terms of Service" prescribed by the Minister.

The main obligations are:—

- (1) To supply with reasonable promptness any drug or medicine, or appliance prescribed by the Regulations, whether mentioned in the Drug Tariff or not, on presentation of an order on one of the prescription forms issued by the committee and signed by a doctor on the panel or his deputy. The order must not require reference to any earlier prescription.
- (2) To keep in stock, as far as is practicable, drugs and appliances mentioned in the tariff.
- (3) To supply drugs, etc., of the quality specified or of a quality ordinarily used for medicinal purposes if not in the tariff.
- (4) To keep open for the supply of drugs, etc., during hours arranged between the Insurance and Pharmaceutical Committees. Prescriptions presented after the hours arranged need not be dispensed unless marked "Urgent" by the prescriber, in which event an increased dispensing fee is payable. (The requirement as to prescriptions marked "Urgent" and payment of an increased dispensing fee do not apply in Scotland.)
- (5) To exhibit a notice indicating what he is under contract to supply, the times when the shop is open, and also a notice giving the nearest address and the times at which supplies can be obtained when the shop is closed. (The latter notice is not required by the Scottish Regulations.)
- (6) To supply all drugs, etc., without charge to the insured person, other than a deposit on the container if one is not supplied by the insured person. The deposit must be refunded if the container is returned in a clean condition.

Discount or gifts to induce a person to bring prescriptions to him are prohibited.

Disposal of Prescriptions

All prescriptions must be retained and sent to the Insurance Committee for pricing and checking.

It is unnecessary to make or keep a copy of a prescription containing a poison in order to comply with the Poisons Rules made under the Pharmacy and Poisons Act, 1933, but the necessary records required by the Dangerous Drugs Act and Regulations must be kept and the date of dispensing must be marked on a prescription for a Fourth Schedule poison.

Payment

A sum called the Chemists' Central Fund is set aside annually by the Minister, who has appointed a Pharmaceutical Distribution Committee

to advise upon the proportional distribution of the Fund among Insurance Committees. From the amount received, these Committees pay the accounts of the chemists on their panels.

The Testing of Dispensing

A prescription in duplicate is taken by an agent of the Insurance Committee to a pharmacist, selected by the Clerk to the Insurance Committee (subject to the general direction of the Chairman of the Pharmaceutical Service Sub-Committee). When dispensed, the agent must disclose the fact that it is a test prescription and the pharmacist must divide the medicine into two equal parts in the presence of the agent, who must provide a clean container for the purpose. If the medicine is liquid, before division the agent must mark on the original bottle the height of the medicine. If the medicine is a solid the total weight of medicine and container must be ascertained and marked on the container by the agent. Both samples are then sealed up by the agent and may be sealed also by the pharmacist. The prescription form and the duplicate are to be marked with an identification number by the agent, and stamped by the pharmacist with his name and address. The original prescription is kept by the pharmacist, and the other taken away by the agent with both the samples, each having been marked with the identification number. One is sent to the official analyst and one kept in the office of the Insurance Committee, who on the request of the pharmacist must send it to any analyst named by him in writing. The analyst's report is sent to the Chairman of the Pharmaceutical Service Sub-Committee, and a member of the Sub-Committee who is a registered pharmacist, who decide whether or not the case is one for further investigation.

Scotland

The provision of Medical Benefit in Scotland is governed by the Medical Benefit Regulations (Scotland) 1938. These follow the general lines of the English Regulations; the main differences are in connection with (a) the supply of medicines by doctors, (b) payments, and (c) the testing scheme.

THE SHOPS ACTS 1912-1936

These Acts and the Regulations of 1937 regulate hours of employment of shop assistants, provide for the closing of shops on one half-day weekly, control the employment of young persons and make provision for the comfort and health of the assistants.

Closing. Every shop, unless exempted, must be closed not later than 1 p.m. one day in each week. On other days the closing hour must not be later than 8 p.m. except on the "late day" when the premises may be open until 9 p.m. The Local Authority may make orders fixing the day for the half-holiday and for altering the usual "late day" (Saturday) to another weekday. Where the half-day is fixed for another day than Saturday the order must provide for Saturday as an alternative and vice versa.

Both the half-day and the closing hour may be varied by order of the Local Authority to meet local requirements. The half-day for different classes of business, different districts or different periods of the year can be fixed by such Order after enquiry, subject to a majority approval of occupiers of the several classes of shops affected. The night closing hour may in the same way, be fixed at an earlier hour, provided it is not earlier than 7 p.m. (*Note.* This may be overridden in war-time by Defence Regulations making closing hours earlier than 7 p.m.)

Exemptions. The sale of medicines and medical and surgical appliances is exempted from the provision of these Acts. The sale, from a pharmacy, of goods not coming within this exemption would be subject to any general closing order for that class of goods in any other shop.

Exempted goods may be sold at any time after the closing hour, provided that the shop is kept open and lighted—if lighting be needed—only so long as is necessary for supplying the customer.

Where this business is carried on in the same shop with a trade or business not exempted, the exemption only applies if, after the hour of closing on the day of the weekly half-holiday, there is exhibited in some conspicuous places on the exterior and in the interior of the shop, notices in letters of the size of not less than two inches in accordance with a prescribed form. The usual wording adopted for a pharmacy is: "This shop is closed for to-day except for the sale of medicines and medical and surgical appliances."

Assistants' Weekly Half-holiday. Every shop assistant must be free from 1.30 p.m. onwards on one half-day in each week even though the shop remains open for the sale of exempted articles.

The employer must fix these days, which may be the same or different days, for all assistants and a notice in the prescribed form must be exhibited on the premises giving a full record of the arrangements.

The exceptions to the requirement of the weekly half-holiday are:—

- (1) in the week preceding a Bank Holiday, where the assistant has the Bank Holiday and the half-holiday in the same week as the Bank Holiday, he need not be given a half-holiday;
- (2) in holiday resorts during the season when the early closing time has been suspended, the obligation to give assistants a weekly half-holiday may also be suspended by the local authority. In such case, however, they must receive at least a fortnight's holiday a year on full pay.

Meal times

- (1) Assistants boarded indoors: $\frac{1}{2}$ hour for dinner between 11.30 a.m. and 2.30 p.m.
 $\frac{1}{2}$ hour for tea between 4 p.m. and 7 p.m.
- (2) Assistants not boarded indoors: 1 hour for mid-day dinner and $\frac{1}{2}$ hour for tea.

The interval between meals must not exceed six hours.

Seats for Female Assistants. The Shops Act, 1934, requires the occupier of the shop to permit female assistants to make use of the seats which he was required to provide under the Shops Act, 1912.

Lighting, etc., of Shops. Suitable means of lighting, heating and ventilating shops and workrooms must be provided and maintained, in addition to suitable sanitary arrangements. Where employees take meals in the shops adequate facilities must be provided and maintained for this purpose.

Employment of Young Persons. No person under eighteen years of age may be employed in or about the business of a shop for more than forty-eight hours a week, excluding meal times, subject to the following exceptions. In times of seasons or exceptional pressure overtime may be worked by persons over sixteen up to fifty hours in the year spread over a period of six weeks, whether consecutive or not, but in no week may more than twelve hours overtime be worked.

In every twenty-four hours between noon and noon there must be an interval of eleven consecutive hours, including the hours 10 p.m. to 6 a.m.

The occupier of the shop is required to keep records of the hours worked and the intervals allowed for meals and rest.

By the Education Act, 1918, the employment of a child under the age of twelve is prohibited. The employment of a child between the ages of twelve and fourteen years is permissible only during certain hours of the day and subject to the conditions laid down by the Local Authority.

Sunday Closing. Under the Shops (Sunday Trading Restriction) Act, 1936, all shops must be closed on Sunday. Certain exemptions are applicable to holiday resorts and to persons of the Jewish religion or members of any religious body regularly observing the Jewish Sabbath. There are also exemptions in respect of the sale of certain articles. The sale of medicines and medical and surgical appliances is permitted to take place on a Sunday, if the sale is effected:—

- (1) upon premises registered under Section 12 of the Pharmacy and Poisons Act, 1933, or
- (2) by any person who has entered into a contract with an insurance committee under the National Health Insurance Act, 1936, for the supply of drugs and appliances.

Sunday Employment. No person may be employed on a Sunday about the business of a shop which is open for the serving of customers unless—

- (1) In the case of a person employed for more than four hours on any Sunday he receives in lieu of his employment on that Sunday a whole day's holiday on

a weekday other than that of his statutory half-holiday in the week immediately preceding the Sunday or the week immediately following it. No person may be employed about the business of a shop on more than three Sundays in the same month.

- (2) In the case of a person employed for not more than four hours on a Sunday in any month, he receives in lieu of such employment a half-holiday in addition to his statutory half-holiday during the week immediately preceding that Sunday or during the week immediately following it.

A registered pharmacist may be employed in connection with the sale or supply of medicines or medical or surgical appliances in premises required to be open on a Sunday in pursuance of a contract with an insurance committee under the National Health Insurance Act, 1938, if he is not employed for more than two hours on that Sunday and has not been employed on the previous Sunday and if on a week-day (other than the usual half-holiday) of the previous week or the week following he has not been or will not be employed either before 10.30 a.m. or after 6.0 p.m.

THE CANCER ACT, 1939

Local authorities must provide adequate facilities for the treatment of persons suffering from cancer.

Authority is given to the Minister of Health to lend, subject to certain conditions, an amount up to £500,000 to the National Radium Trust for the purchase of radium and similar substances together with the necessary equipment for treatment.

Advertisements. Advertisements making certain claims or offers to persons suffering from cancer are prohibited.

The prohibition extends to

- (a) taking part in the publication of any advertisement,
- (b) offering to treat any person,
- (c) offering to prescribe any remedy,
- (d) offering to give any advice or treatment,
- (e) any reference which might lead to the use of an article for treatment.

Meaning of "advertisement". The term covers any notice, circular, label, wrapper or any other document and includes any announcement made orally or by any means of producing or transmitting sounds.

Exemptions

- (A) An advertisement published only so far as is reasonably necessary to bring it to the notice of persons in the following classes:—

- (1) members of either House of Parliament, or of a local authority, or of the governing body of a voluntary hospital;
- (2) local authority officials concerned in making or carrying into effect arrangements for the provision of adequate facilities for the treatment of persons suffering from cancer;
- (3) registered medical practitioners;
- (4) registered nurses;
- (5) registered pharmacists and authorised sellers of poisons;
- (6) medical, nursing and pharmaceutical students;
- (7) persons carrying on a business which includes the sale or supply of surgical appliances.

- (B) An advertisement published only in a technical publication intended for circulation mainly amongst persons of the classes mentioned in (1) to (7) above.

Penalties

First conviction not exceeding £50.

Subsequent " " " £100 and/or up to 3 months imprisonment.

VENEREAL DISEASES ACT, 1917

Venereal disease covers syphilis, gonorrhoea or soft chancre. Only duly qualified medical practitioners may treat, prescribe for or give advice on the treatment of these diseases.

Advertisements Advertisements are controlled in a way parallel with the Cancer Act with the addition that no preparation or substance may be offered as a medicine for the prevention, cure or relief of these diseases.

Exemptions

- (1) An advertisement, notification, announcement or holding out made or published
 - (a) by any local or public authority,
 - (b) with the sanction of the Local Government Board;
- (2) Any publication sent to
 - (a) duly qualified medical practitioners,
 - (b) wholesale or retail chemists for the purposes of their business.

It should be noted that advertisements in trade journals are not exempted.

Application The Act extends to any area where a scheme for free treatment of these diseases has been adopted and practically every area in Great Britain comes within the scope of the Act. Whether such order exists or not the case should always be referred to a medical practitioner.

Penalties On conviction on indictment, to imprisonment, with or without hard labour, for a term not exceeding two years. On summary conviction, to a fine not exceeding £100 or to similar imprisonment not exceeding six months.

THE SALE OF ABORTIFACIENTS

Where the slightest suspicion exists that any drug or article is being bought for the purpose of abortion the seller should refuse to supply. Although the prosecution must prove that the substance administered is noxious it is most unlikely that the defendant can provide evidence to prove the contrary. The fact that the woman may not be with child is no defence and transactions even through third parties must be regarded with the same care. Contravention of the law is an offence of the utmost gravity and the penalties are severe.

PROTECTION OF ANIMALS

Cruelty to Animals Act, 1876, and Animals (Anæsthetics) Act, 1919

Painful experiments or operations are forbidden unless the animal is anæsthetised. In cases where an anæsthetic would interfere with the object of the experiment application may be made to the Home Office for a certificate to permit the work being done without an anæsthetic. Both the person performing the operation and the premises where it is carried out must be licensed.

Protection of Animals Act, 1911

(1) Poisonous or injurious drugs or substances must not be administered to animals without reasonable cause. It is also an offence to cause such administration to be made. Fine not exceeding £25, or imprisonment.

(2) Unless for bona fide use in agriculture, grain or seed which has been rendered poisonous must not be sold or given away. Exposure of such material for sale or being a party to any such transaction is equally an offence. Fine, not exceeding £10.

(3) The laying, or being a party to laying, any poison or poisonous substance (sown seed or grain excepted) on any land or building is an offence except for the purpose of destroying rats, mice or other small vermin if precautions are taken to prevent dogs, cats, fowls or other domestic animals having access to the poison. Fine, not exceeding £10.

POISONING

SYMPTOMS AND ANTIDOTES

The pharmacist who keeps open shop may be called upon to render first aid in cases of poisoning and the immediate aim must be to remove the poison from the body or to convert it into an inert form. Poisons usually enter the body by being swallowed or inhaled. Cases in which the poison is administered by other routes, such as by hypodermic injection, are uncommon. In the case of swallowed poisons, removal is best effected by washing out the stomach: only when a stomach tube is not available should an emetic be given.

An outfit for use in the emergency treatment of poisoning should include the following necessities:—

- A fairly stiff stomach tube with glass or enamel funnel.

- Small oesophagus tube for children.

- Two mouth gags, or two large corks.

- A tongue clip, or large safety pin.

- Two jugs.

- A pail.

- A cylinder containing 93% Oxygen and 7% Carbon Dioxide.

- A face mask, such as is used for nitrous oxide or oxygen inhalation or a nasal catheter.

- A hypodermic syringe and needles.

- A supply of the following drugs for hypodermic injection:—

 - Morphine, $\frac{1}{4}$ gr.

 - Nikethamide, 25% solution.

 - Strychnine, $\frac{1}{4}$ gr.

 - Atropine Sulphate, 1/60 gr.

 - Picrotoxin, 0.3% solution.

 - Capsules of Amyl Nitrite for inhalation.

With these at hand for his own use or for the use of the physician, *who must be sent for immediately*, the pharmacist can feel that he has done the best that his profession expects of him. Most of the other emergency necessities, including the emetics, demulcents, antidotes, and stimulants, referred to on pages 246 to 248, can be found on the shelves of every pharmacy. The later treatment must be carried out in hospital.

Use of the Stomach Tube. To lavage or wash out the stomach, a fairly stiff rubber tube with a funnel attached at one end is used. The rubber tube should be at least 5 feet long and $\frac{1}{4}$ inch in diameter (*i.e.*, No. 23 to No. 30 of English catheter gauge). If the tube is less than 5 feet long it should be connected with about another 2 feet of rubber tube by means of a glass union. The end of the tube must be rounded and smooth.

It is essential that the patient should be placed in a proper position so that the respiratory tract is not liable to be flooded with fluid from the mouth. The patient's mouth and pharynx must be on a lower level

than the larynx. The most satisfactory position is for the patient to be lying prone on a table, bed or couch with the face projected over the end and looking down towards the floor. False teeth must be removed and gags inserted at each side of the mouth.

Before the stomach tube is passed, the distance to which it must be passed is marked by inserting a safety pin through the wall of the tube, but not through its lumen. For adults this distance should be 20 inches, for infants under 2 years, 10 inches. The end of the stomach tube should be lubricated with liquid paraffin or glycerin and passed into the mouth in the mid-line until it touches the back of the pharynx, it should then be pushed rapidly down the oesophagus into the stomach until the safety pin is just outside the lips. One pint of tepid water ($\frac{1}{2}$ to $\frac{3}{4}$ pint for children) is now poured into the funnel and syphoned back by quickly lowering the funnel into a pail. (Important.—The first pint should be set aside for possible subsequent analysis.)

The lavage must be continued a pint at a time until 2 gallons have been used. It is important to check the volume of water returned against the volume used, as loss of any appreciable quantity would mean that the stomach was perforated and surgical operation necessary.

Stomach washout should be used in all cases of swallowed poisons except corrosive acids and alkalis, even if the patient seems perfectly well, or some hours have elapsed since the poison was swallowed.

GENERAL PRINCIPLES OF TREATMENT

1. Remove the poison from the body if that is possible. For poisons taken by mouth, the poison must be completely removed from the stomach, by thorough gastric lavage.

Emetics (see list on page 246) should be given only when stomach tube is not available. (Caution. In cases of poisoning by corrosive acids and alkalis, i.e., strong sulphuric, hydrochloric or nitric acid, caustic soda, caustic potash and strong ammonia, gastric lavage and emetics must not be used.)

2. Administer the appropriate antidote (see list below). If the appropriate neutralising antidote is available it may be added to the water used for the washout. With the exception of poisoning by the corrosive acids and alkalis, antidotes given by mouth are relatively unimportant in the treatment of poisons.

3. When the poison has been eliminated as far as possible, give demulcents.

4. Counteract those effects of the poison that are immediately endangering life. Although in almost all cases of acute poisoning the ultimate cause of death is circulatory failure, this is a secondary effect consequent upon one or more of the following primary lethal effects:—asphyxia, coma, loss of fluids and chlorides, pain or shock, delirium or convulsions.

These conditions must be treated as they arise:—

Asphyxia. Maintain a clear air-way and apply artificial respiration when needed. Administer oxygen with 7% carbon dioxide.

Coma. Give large doses of strychnine or nikethamide— $\frac{1}{4}$ gr. strychnine hydrochloride subcutaneously or 5 to 15 ml. of nikethamide intravenously or intramuscularly, repeating after 1 to 3 hours as necessary.

In severe cases of toxic coma, lumbar puncture and saline injections intravenously or per rectum may be required.

Loss of Fluids and Chlorides results from severe vomiting and diarrhoea and may produce collapse, intense thirst, and pains in the limbs, and later delirium and coma. Give copious drinks of water and salt (40 gr. to 1 pint) with dextrose. In severe cases adults may need as much as 1 gallon, to replace the fluids deficient. If the patient's condition is serious the normal saline solution or dextrose solution must be given intravenously. Emptying of the bladder by catheter may be necessary in comatose patients.

Pain should be relieved by the immediate subcutaneous injection of $\frac{1}{4}$ gr. of morphine sulphate or tartrate.

Shock and Collapse. The principal factor in the production of shock and collapse is loss of fluid and loss of chloride. Treat collapse by warmth—hot-water bottles (beware of burning an unconscious patient), hot blankets—give strong coffee by mouth or rectum or hot sweetened tea by mouth, raise foot of bed. Blood transfusion or plasma transfusion may be required.

Convulsions. Violent delirium and convulsions due to poisoning may be treated by one of the barbituric acid derivatives, preferably given intravenously, although this may be difficult in a violent or convulsed person. Hexobarbitone soluble, pentobarbitone or sodium amylal should be given in 10% solution, by intravenous injection, drop by drop at a rate not less than 1 ml. per minute until the patient has passed into a quiet sleep; larger doses than those used for basal narcosis will be required to control convulsions. If the injection cannot be made into a vein it may be given intramuscularly at the rate of 1 ml. of 10% solution per 20 lbs. of bodyweight. In less severe cases chloral hydrate, 40 gr. in 3 oz. of water, may be given per rectum or by mouth, or potassium bromide, 30 to 60 gr. in water by mouth.

ANTIDOTES

The following articles are the most useful antidotes in cases of poisoning. The quantities given are for adults, and for a single dose, which must be repeated, within the limits of safe dosage, according to the severity of the symptoms and the quantity of poison ingested.

EMETICS

Apomorphine Hydrochloride, 1/10 gr. for hypodermic injection.

This will usually produce vomiting in five minutes.

Powdered Ipecacuanha (not Pulv. Ipecac. Co.), 30 gr. in water.

Liquid Extract of Ipecacuanha, 20 m. in water.

Ammonium Carbonate, 30 gr. in water.

Zinc Sulphate, 30 gr. in 8 oz. warm water.

Mustard, one tablespoonful in 8 oz. water.

Common Salt, one tablespoonful in warm water.

In many cases it is desirable to give a combined emetic. Thus, begin with a tablespoonful of mustard in a tumbler of water and follow it as quickly as possible with an emetic draught of 30 gr. of zinc sulphate and 60 gr. of powdered ipecacuanha to be taken in water. This may be

followed by a hypodermic injection of apomorphine 1/10 gr., repeated if necessary. The action of the emetic is facilitated by giving plenty of tepid water. If there is delay in obtaining emetics, tickling the fauces may be resorted to.

DEMULGENTS

Milk.

Olive Oil or Arachis Oil.

Thick Gruel (fine oatmeal, 1 oz., mixed and boiled with 10 oz. of water).

White of Egg.

STIMULANTS

(a) *Acting Directly on the Medullary Centres:—*

Atropine Sulphate 1/60 gr. by hypodermic injection.

Caffeine and Sodium Benzoate (or Salicylate) 2 to 5 gr. by hypodermic injection.

Hot Coffee by mouth or rectum.

Strychnine Hydrochloride 1/60 to 1/3 gr. by hypodermic injection.

Nikethamide.

Picrotoxin.

Carbon Dioxide 7% in Oxygen 93% for inhalation.

(b) *Acting by Reflexly Affecting Cardiac and Respiratory Centres:—*

Alcohol. Brandy, 1/2 oz. in 2 oz. water.

Ammonia. Smelling salts by inhalation. Aromatic Spirit of Ammonia 60 m. in water by mouth.

Ether. 1 to 2 ml. in 5 to 10 ml. sterile olive oil by intramuscular injection or ethereal injection of camphor 0.25 to 1 ml. by hypodermic injection.

CHEMICAL ANTIDOTES

(a) *Oral Antidotes*

Antidotum Arsenum, B.P.C.

Charcoal, Activated Medicinal, 2 tablespoonfuls or more.

Magnesium Oxide, 4 tablespoonfuls in 5 to 10 oz. of water.

Saccharated Solution of Lime.

(If neither of the two latter is available, soapsuds, calcium carbonate, whitewash, ceiling plaster or sodium carbonate may be used, but the carbonates are best avoided on account of the distension caused by evolution of carbon dioxide.)

Vinegar, 3 oz. in 5 to 10 oz. of water.

Lemon Juice.

Citric Acid.

Tartaric Acid. } Weak solutions.

(b) *Stomach Washouts*

For washing out the stomach, the quantities of antidotes stated below may be added to 2 gallons of water.

Magnesium Sulphate, 2 oz.

Sodium Sulphate, 2 oz.

Potassium Permanganate, 60 gr.

Sodium Bicarbonate, 1½ oz.
Tannic Acid, 180 gr.
Calcium Oxide, 4 oz.
Thin Starch Mucilage.
Copper Sulphate, 15 gr.
Sodium Chloride, 2 oz.

(c) *Injections*

The following solutions are given by intravenous injection:—

Dextrose, 0.5% solution.
Normal Saline, 0.9% solution.
Sodium Thiosulphate, 20% solution, 10 to 50 ml.
Picrotoxin, 0.3% solution. (Dose 1/10 to 1/6 gr. (3 to 10 mg.) intravenously or intramuscularly; repeated at intervals of 1 to 20 minutes until signs of spontaneous movement and restlessness occur; then repeated in dosage sufficient to maintain this effect but not sufficient to produce convulsions.)
Liquor Ringer-Lactatis, B.P.C.
Magnesium Sulphate, 8% solution.
Soluble Hexobarbitone, 10% solution.

INHALED POISONS

When the poison has been inhaled, *e.g.*, in cases of poisoning with chloroform, alcohol, gases, such as carbon monoxide or dioxide, coal gas, petrol fumes, sewer gas, ship's hold gas, acetylene, or chlorine, elimination of the poison is effected by inducing an increase in breathing. This is most effectively done by making the patient inhale a mixture of 7% carbon dioxide and 93% oxygen from a face mask. If breathing has ceased or almost ceased and when facilities for inhalation of the carbon dioxide-oxygen mixture are not available, artificial respiration must be performed.

Artificial Respiration (Schafer's Method). 1. See that the air passages are not obstructed. Pull the patient's tongue forward and keep it protruding beyond the lips by means of a piece of tape, an elastic band, safety pin or tongue clip.

2. Keep the nostrils free from obstruction.

3. Have the room well ventilated.

4. Place the patient face downwards on the ground, preferably with a cushion or folded blanket beneath the lower part of the chest, the face turned to the right or left, so that the mouth and nose do not touch the ground.

5. Place yourself, kneeling, on one side of the patient, facing his head, and place one hand on each side of his back flat over the lowest ribs. Bending forwards, squeeze the chest so as to drive out the air. Pushing strongly, rise to the vertical position (still on the knees) and relax the pressure, but do not remove your hands. Alternate these movements by a rhythmic swaying backwards and forwards of your body twelve to fifteen times a minute, and continue for at least an hour or more if necessary.

The pressure must not be violent. In the case of small children comparatively very gentle pressure is used.

TREATMENT IN SPECIAL CASES

The various poisons are arranged in groups, alphabetically under the name of the active principle or typical member of each group. Apply in all cases the general principles of treatment, modified or supplemented as described under each group.

POISONS	SYMPTOMS	TREATMENT
ACETANILIDE Phenacetin Phenazone Amidopyrine	Vomiting; sweating; face cyanosed; may be skin rash; pulse irregular and feeble; respiration slow; collapse.	Stomach tube or emetic; warmth externally. Aromatic spirit of ammonia 60 m. in water. Ammonia inhalations. Keep patient lying down. Oxygen and carbon dioxide. Artificial respiration. — Strychnine $\frac{1}{2}$ gr. Normal saline or dextrose, intravenously.
ACIDS, MINERAL Hydrochloric Nitric Sulphuric Spirits of Salts Acetic, Glacial Soldering Fluid Battery Fluids	Burning pain in mouth and stomach. Intense thirst. Lining of mouth and throat swollen and corroded. Vomiting of altered blood, shreds of membrane and coagulated mucus. Pronounced collapse and shock; rapid feeble pulse, eyes sunken and pupils dilated, cold extremities, clammy sweat.	Alkalis, with water should be given immediately, e.g., magnesia, saccharated solution of lime, carbonates are best avoided, but soap solution may be given in emergency. Stomach tube should <i>not</i> be used. Give injection of morphine, $\frac{1}{2}$ gr. to relieve pain. A demulcent, e.g., milk, gruel, olive oil, white of egg, etc. Apply warmth to the body and extremities; treat for shock. Support back on pillows.
ACID, CARBOLIC Cresosote Lysol Phenol, etc.	Burning sensation, extending from mouth to stomach. Characteristic smell. Lips, ears, eyelids livid; skin cold and clammy. Difficulty in all movements of mouth and throat. Urine dark, turning black on exposure to air.	Stomach tube may be used with caution. Use a warm solution of sodium or magnesium sulphate to wash out until the characteristic smell disappears. Then give white of egg in water or milk, or olive oil. Strychnine, $\frac{1}{2}$ gr. Apply warmth to the whole body. Oxygen and carbon dioxide may be given or artificial respiration applied. Intravenous or rectal injection of normal saline solution.
ACID, HYDROCYANIC Cyanides Bitter Almond Oil	The effect of this poison is almost instantaneous. If an adequate amount has been taken, death may follow immediately. Ciddiness, staggering, insensibility, eyes fixed and glistening, pupils dilated, gasping for breath, cold clammy skin, pulse imperceptible. This poison is rapidly eliminated, so if life can be maintained for even half an hour, recovery is probable.	If patient is seen immediately the poison has been taken, place in open air. Empty stomach by stomach tube, using 60 gr. of potassium permanganate in 2 gall. of water or 4 gr. emetic. Dash cold water over face and chest. Stimulants, ammonia, inhalation of amyl nitrite, artificial respiration. Inject atropine $\frac{1}{6}$ gr. Sodium thiosulphate, 10 to 50 ml. of 20% solution intravenously.

POISONS	SYMPTOMS	TREATMENT
ACID, OXALIC Salt of Sorrel Salts of Lemon	Burning pain in throat and stomach radiating over abdomen; vomiting; no diarrhoea; cyanosis; collapse; voice very low and later lost completely; numbness of extremities; convulsions. If a large amount has been taken death may be almost instantaneous.	Do not use emetic. Give calcium oxide or saccharated solution of lime to form an insoluble oxalate. Use stomach tube cautiously with 4 ozs. of calcium oxide in 2 gal. of water. Give full dose of castor oil. Do not give potassium, sodium or ammonium salts. Give milk freely. Saline infusion with dextrose for collapse.
ACONITE Monkshood Aconitine	Tingling and numbness of tongue and mouth; numbness of finger tips, paralysis first of lower then of upper extremities; nausea and possible vomiting; prostration great, but the mind usually clear. Difficulty in breathing; pulse irregular, weak, slow. Skin cold, clammy, face blanched. Death may occur quite suddenly.	Wash out stomach, using 180 gr. of tannic acid in 2 gal. of water; or give emetic; medicinal charcoal in water; intravenous saline injection; all volatile; apply warmth to extremities and give stimulants freely. Patient must be kept recumbent and artificial respiration applied for two hours if necessary. Give injection of atropine $\frac{1}{4}$ gr.; if no improvement give injection of digitalin $\frac{1}{10}$ gr. hypodermically.
ALCOHOL (Acute poisoning)	Confusion of mind, eyes congested, pupils dilated, expression vacant, giddiness, tottering gait, lips livid, breath alcoholic, convulsions possible with stupor or coma.	Stomach tube or emetic; rouse patient by every means possible, but not with cold water, except in very mild cases. Ammonia inhalation; hot strong coffee. Inject strychnine, $\frac{1}{2}$ gr. Artificial respiration may be necessary. Oxygen.
ALKALIS Potash Soda Ammonia Harshorn Weed Killer	Immediate burning pain in mouth, throat, and stomach. Lining membranes swollen and detached. Usually purging with straining and vomiting, with copious discharge of salivary fluid with altered blood. Voice reduced to a whisper or even lost. Severe shock, skin cold and clammy; pulse rapid and feeble.	Do not use stomach tube or emetics. Give abundance of dilute vinegar, or lemon or orange juice in water. Avoid acids if carbonates have been taken and give instead magnesium sulphate. Give demulcents freely, e.g., milk, white of egg, olive oil. Inject morphine, $\frac{1}{2}$ gr., if necessary. Treat for shock: if respiratory embarrassment severe, tracheotomy may be necessary.
AMPHETAMINE	Headache, giddiness, restlessness, pallor, irregular pulse, dryness of mouth, sleeplessness, tremor, palpitation, convulsions, respiratory failure, cyanosis, collapse, coma.	Stomach tube, using water; artificial respiration, or carbon dioxide and oxygen inhalation; dextrose intravenously; warmth to extremities; chloral hydrate for insomnia.

POISONS	SYMPTOMS	TREATMENT
ANTIMONY SALTS Tatar Emetic Butter of Antimony	Burning heat with choking sensation. Violent pain in stomach with incessant vomiting and purging. Skin cold and clammy. Cramp in legs. Collapse. Urine not usually suppressed as in arsenic poisoning.	Stomach tube, using tannic acid, 180 gr. in 2 gall. of water or emetic. Give tannic acid, 20 gr., in water and repeat 5 gr. doses every $\frac{1}{2}$ h. for 4 or 5 doses. Give generous quantities of tepid water. Strong tea or coffee freely and demulcents. Apply warmth. Inject morphine, $\frac{1}{4}$ gr. Intravenous or rectal injection of normal saline solution.
ARSENIC COMPOUNDS White arsenic Weed Killers Some Vermin Killers Sheep Dips Some Fly Papers	Symptoms presented are similar to those described under Antimony, but the urine is usually suppressed.	Stomach tube or emetic. It is important to empty stomach completely. Repeated draughts of warm milk and water, or hot water with olive oil. Give Antidotum Arsenum B.P.C. Give demulcent drinks freely. Apply warmth and when acute symptoms have subsided give injection of morphine, $\frac{1}{4}$ gr. Olive oil, castor oil, or caron oil should be given frequently to allay intestinal irritation.
ASPIRIN Methyl Salicylate	Onset of symptoms usually delayed for a few hours. Nausea, vomiting, mental confusion, deafness; later coma. Pulse rate slightly increased; respiration deep and slow. Pale; profuse perspiration. Dehydration.	Stomach tube, using 5% sodium bicarbonate solution; or emetic. Give milk or water freely, containing a little sodium bicarbonate. Lumbar puncture. Intravenous injection of saline containing sodium bicarbonate or of Ringer-lactate solution. Purgatives to aid elimination of drug. Keep patient warm.
ATROPINE Nightshade Belladonna Stramonium Hyoscyamus	Pupils dilated and insensible to light. Heat and dryness of mouth and throat, difficulty in swallowing, extreme thirst, great excitement, noisy delirium, frequent desire to urinate with inability to do so.	Stomach tube, using potassium permanganate, 60 gr. in 2 gall. of water or emetic. Barbiturates for delirium; chloroform or ether for convulsions. Later, respiratory stimulants and apply warmth. Enema of a pint of hot, strong coffee. Fluid freely by mouth or rectum. Catheterise if retention of urine. Oxygen and carbon dioxide, or artificial respiration if necessary for two hours.

POISONS	SYMPTOMS	TREATMENT
BARBITURATES	Headache and giddiness soon followed by profound sleep, passing into coma; breathing noisy and irregular; muscles flaccid; cyanosis; pupils at first small and react to light; temperature sub-normal; body cold and clammy, pulse rather rapid. May be incontinence of urine and faeces. Large blisters may form on skin. Bronchopneumonia very likely to occur.	Stomach tube, using 2 gall. of warm water. Do not use sodium bicarbonate or other alkali. Strong coffee, dextrose; and a purgative should be left in stomach. Repeat stomach washing in 4 hours. Picric acid, $\frac{1}{2}$ gr. to $\frac{1}{4}$ gr. (3 to 10 mg.) intravenously or intramuscularly repeated at intervals of 1 to 10 minutes. Patient must be kept warm, and, if possible, awake, but must not be walked about. Strychnine, $\frac{1}{2}$ gr., injected repeatedly. Nikethamide injections. Fluids freely. Dextrose solution intravenously. Lumbar puncture, especially if lung complications develop. Artificial respiration; oxygen and carbon dioxide.
BENZENE	<i>Vapour</i> acts as narcotic, producing head noises, headache, dizziness, nausea, trembling, convulsions, difficulty in breathing. Coma. <i>Internally</i> , causes dilated pupils, coldness of extremities, distension of abdomen.	Stomach tube or emetic. If poison has been inhaled these are useless. Fresh air is most important. Oxygen and carbon dioxide or artificial respiration. Alternate hot and cold water douches from a height. Stimulants, ammonia inhalation. Injection of atropine sulphate, $\frac{1}{10}$ gr.
CAMPHOR Camphorated Oil	Skin cold and clammy, features shrunk. Characteristic odour. Urinary irritation, breathing difficult, pulse quick and weak. Vomiting; mental excitement, giddiness, tremor, convulsions followed by paralysis.	Stomach tube or emetic. Stimulants, <i>e.g.</i> , strychnine, $\frac{1}{2}$ gr., digitalin $\frac{1}{4}$ gr., or caffeine sodium benzoate, 2 gr., hypodermically, should be given freely. If camphor taken in solid form do not give spirits by mouth. Apply warmth to extremities.
CANTHARIDES	Characteristic symptom is incessant desire to urinate, but only a little blood or albuminous urine is passed. Burning pain in throat and stomach with difficulty in swallowing. Vomiting, diarrhoea, salivation. High temperature, rapid pulse and convulsions.	If seen early, use stomach tube. If mucous membranes are very blistered, give emetic followed by egg white or thick gruel; <i>no fat or oil</i> . Give injection of morphia, $\frac{1}{4}$ gr., if there is much pain.
CARBON MONOXIDE (See Cases)		

POISONS	SYMPTOMS	TREATMENT
CHLORAL HYDRATE	Deep sleep. Loss of muscular power. Face livid and bloated. Pulse and respiration slow. Extremities and surface of body cold. Death by arrest of respiration or paralysis of the heart.	Stomach tube, using 2 gall. of water at 105°F., or emetic. Keep patient warm and recumbent and arouse if possible. Hot, strong coffee rectally. Inject strychnine, $\frac{1}{16}$ gr., and caffeine sodium benzoate, 2 gr. Oxygen and carbon dioxide, artificial respiration if necessary. Dextrose freely.
CHLOROFORM (Swallowed)	Characteristic odour. Burning pain in throat and stomach. Pupils dilated, pulse weak. Sleep, passing into complete anesthesia.	Stomach tube or emetic. Large draughts of solution of sodium carbonate in water. Rouse patient in every way, but keep recumbent. Give one pint hot coffee with 5% dextrose rectally. Give oxygen and carbon dioxide, apply artificial respiration. No fats for some days; dextrose freely.
COCAINE	Very much according to individual peculiarities. Usually pallor, giddiness, faintness, rapid respiration and pulse, pupils dilated, severe prostration, mental excitement and convulsions. Numbness, tingling of extremities.	If taken by the mouth use stomach tube with dilute solution of potassium permanganate or tannic acid; charcoal stirred up in water; in every case give injection of strychnine, $\frac{1}{4}$ gr.; phenobarbitone by mouth or by intravenous injection. Nikethamide. Ammonia inhalations. Apply warmth and give hot, strong coffee. Give oxygen and carbon dioxide and apply artificial respiration.
CODEINE (See Morphine)		
COLCHICUM	Burning pain in stomach and throat, intense thirst, persistent vomiting and purging. Prostration, pain in limbs and small quick pulse.	Stomach tube or emetic. Give repeated doses of tannin. Copious draughts of milk, egg white in water or barley water. Saline or dextrose intravenously. Stimulants: morphine, $\frac{1}{4}$ gr., with atropine, $\frac{1}{160}$ gr. hypodermically.
COLOCYNTH Croton oil Jalap and other drastic purgatives	Severe abdominal pain. Vomiting, diarrhoea, blood-stained watery stools; sweating; weak pulse, delirium.	Wash out stomach with tannic acid solution; or give emetic. Apply warmth externally; give demulcents; aromatic spirit of ammonia; tincture of opium by mouth or rectum, or morphine hypodermically. Saline intravenously. Stimulants.

POISONS	SYMPTOMS	TREATMENT
COPPER SALTS Blue Stone Blue Vitriol Verdigris	Metallic taste in mouth, gripping pains in stomach. Vomiting, purging with much straining. Later rapid pulse, jaundice, delirium, convulsions, and coma.	Milk and eggs freely at first, then use stomach tube or emetics. Give gruel or barley water freely. Apply hot fomentations to abdomen, inject morphine, $\frac{1}{4}$ gr. No fats or oils.
DIGITALIS Foxglove	Severe abdominal pain, purging and vomiting. The vomited matter grass-green in colour. Slow irregular pulse. Pupils dilated, insensible to light. Skin cold and covered in sweat. Head-ache, delirium, coma, and death suddenly.	Stomach tube or emetic. Tannic acid in hot water frequently. Inject atropine, $\frac{1}{16}$ gr., or chloral hydrate, 20 gr., by mouth. Give stimulants and apply warmth and keep patient strictly recumbent. Inhalation of chloroform or amyl nitrite.
ERGOT Ergotamine Ergotoxine Ergometrine	Drowsiness, headache, vomiting. Muscular twitchings. Pupils contracted, delirium, convulsions.	Stomach tube, using tannic acid, 180 gr., in 2 gall. of water. Keep patient warm. Castor oil or magnesium sulphate. Aromatic spirit of ammonia.
ETHER Inhaled (See Chloroform)		
FOOD POISONING	Vomiting, diarrhoea, pain in abdomen, cramp in legs and collapse.	Emetic followed by full dose of castor oil. Apply poultices to abdomen, give stimulants and water freely with powdered charcoal or kaolin. Inject morphine, $\frac{1}{4}$ gr., and atropine, $\frac{1}{16}$ gr.
FUNGI, POISONOUS	Symptoms vary with different fungi; but four groups can be distinguished:— 1. Onset 1 to 3 hours after eating.—Malaise, nausea, vomiting, salivation, diarrhoea profuse, temperature normal, pulse slow, irregular, respirations rapid; urine scanty, pupils contracted, violent noisy delirium, coma. 2. Onset 10 to 12 hours after eating.—Malaise, abdominal pain, vomiting; violent and continuous diarrhoea; vomit and stools contain blood and mucus. Intense thirst, urine scanty; collapse. Maybe cyanosis, severe cramps in calves, coma or jaundice.	Stomach tube followed by castor oil, 1 oz.; Belladonna by mouth, or atropine sulphate, $\frac{1}{16}$ gr. hypodermically. If violent, give barbiturate or morphine. Normal saline intravenously. Apply warmth externally. Stimulants. Stomach tube and give medicinal charcoal stirred up with water. Dextrose and normal saline intravenously; cardiac stimulants intravenously.

POISONS	SYMPTOMS	TREATMENT
FUNGII, POISONOUS—(Contd.)	<p>3. Onset three hours after eating.—Malaise, nausea, vomiting—diarrhoea. Recovery usual.</p> <p>4. Onset 5 to 7 hours after eating.—Vomiting and violent pain in abdomen—diarrhoea unusual. Skin and conjunctive may be yellow; sometimes severe jaundice; delirium, coma. Urine may contain blood.</p>	<p>Stomach tube and give medicinal charcoal, Castor oil, 1 oz. Normal saline intravenously.</p>
GASES Carbon Monoxide Coal Gas Sewer Gas Acetylene	Rapid pulse and respiration, giddiness, singing in the ears; later pulse feeble and breathing noisy; gradual loss of muscular power until insensible. A state of coma may persist for days even in non-fatal cases. Pupils dilated. Skin livid but pink in carbon monoxide poisoning.	Fresh air is essential, administer oxygen and carbon dioxide, apply artificial respiration and moderate stimulants. Friction and warmth to the extremities. (See page 248.)
IODINE	Pain and heat in throat and stomach with vomiting and purging. Intense thirst, giddiness, faintness, and convulsive movements.	Give starch and water freely, saccharated lime solution or sodium thiosulphate solution, 30 gr. in water. Use stomach tube and wash out with dilute solution of sodium thiosulphate and finally with water; or emetic; Demulcent drinks. If much pain inject morphine, $\frac{1}{4}$ gr.
IODIFORM	May be absorbed from wounds. Red rash on skin; may be giddiness, vomiting, pulse rapid, fever; pupils dilated; drowsiness; delirium.	Sodium bicarbonate in water by mouth; keep warm; give stimulants; bromide or phenobarbitone for delirium.
IRRITANTS, VEGETABLE Unidentified plants Violent Purgatives Savin Squill	The symptoms in such cases vary considerably, depending on the causative poison.	Stomach tube or emetic. Apply warmth and artificial respiration if necessary. Give stimulants. Treat collapse.

POISONS	SYMPTOMS	TREATMENT
LEAD (Acute Poisoning)	Dryness of throat; metallic taste and great thirst. Colic relieved by pressure, always constipation. Cramp, cold sweats, convulsions, coma.	Stomach tube, using 2 ozs. sodium or magnesium sulphate in 2 gals. of water and completely remove the precipitated lead sulphate. Give demulcents, milk, white of egg in water, and hot fomentations to the abdomen. Inject morphine, $\frac{1}{4}$ gr., if necessary, with atropine, $\frac{1}{16}$ gr. For convulsions 8% magnesium sulphate subcutaneously, 20 to 30 ml., or glucose intravenously. Sodium thiosulphate 10% solution intravenously, 5 ml. For acute lead colic 10% calcium chloride, 15 ml. intravenously. In acute stage the deposition of lead may be accelerated by diet high in calcium.
LEAD (Chronic Poisoning)	Pallor, lassitude; blue line on gums; colic; palsy (wrist drop); convulsions; delirium. Coma.	In chronic stage, to hasten elimination of lead give ammonium chloride 90 gr. daily with large draught of water and diet low in calcium.
MERCURY Mercurial Salts	Lips and mouth white and swollen, metallic taste in mouth, constricted feeling in throat. Great pain in stomach, salivation, nausea with vomiting and purging. Skin clammy, tongue white and shrivelled. Rapid, feeble pulse, urine suppressed. Convulsions, mind usually remains clear.	Before using stomach tube give unlimited quantities of white of egg mixed with water. The albuminate of mercury formed must be removed from the stomach as soon as possible as it is soluble in excess of albumen and may be absorbed. Either the stomach tube may be used or an emetic given, e.g., apomorphine, $\frac{1}{2}$ gr. Instead of white of egg medicinal charcoal suspended in water may be given and removed as above. If much purging, give tincture of opium 20 m. in water. Normal saline with 5% dextrose intravenously; sodium thiosulphate 10% solution 5 ml. intravenously. Give stimulants and alkalis freely in later stages if suppression of urine is present.
METACETALDEHYDE (Meth fuel)	Onset of symptoms may be delayed 2 or 3 hours, or longer if vomiting occurs. Vomiting, tremors, cramps and convulsions, flushing, restlessness, delirium, staggering gait, coma.	Stomach tube, using sodium bicarbonate solution; repeat in few hours. Purgative. Fluids freely. Normal saline per rectum—alkalis, chloral hydrate and bromide by mouth.

POISONS	SYMPTOMS	TREATMENT
MORPHINE Opium Diamorphine Dover's Powder Codeine Syrup of Poppy Soothing Syrups Chlorodyne Laudanum Paregoric	Agreeable mental excitement with increased physical activity at first followed by drowsiness, weakness, incapacity for exertion, dizziness of mouth and increasing thirst. Later, deep sleep, pupils markedly contracted, face becomes pale or cyanosed, respiration slow, laboured, irregular, and pulse feeble and almost imperceptible.	Keep patient awake and warm. Stomach tube, using a dilute solution of potassium permanganate two-hourly. Give charcoal stirred up in water, and wash out frequently with tepid water. Hot coffee by mouth and rectum; inject strychnine, $\frac{1}{2}$ gr., and atropine, $\frac{1}{16}$ gr. Apply artificial respiration and oxygen and carbon dioxide to combat cyanosis. Ephedrine hydrochloride $\frac{1}{2}$ gr. intramuscularly, repeated hourly if necessary. Nikethamide. Catheterise.
NICOTINE	Burning sensation in mouth and stomach. Salivation, vomiting, diarrhoea. Mental confusion, muscular weakness. Giddiness, restlessness, convulsions, coma. Pulse at first rapid, becoming slow later; respiration slow and weak.	Stomach tube using tannic acid solution. Purgative. Respiratory stimulants. Oxygen and carbon dioxide; artificial respiration. Apply warmth externally.
NITROBENZENE	Burning sensation in mouth and throat. Numbness or tingling. Vomiting. Pallor—later cyanosis—muscular twitchings. Incontinence of urine and feces. Methemoglobinemia. May be temporary recovery and return of vomiting with jaundice.	Stomach tube, using water, till all smell of nitrobenzene removed. Give purgative, avoid oils and alcohol. Blood transfusion may be needed if destruction of red blood cells severe.
NITROGLYCERIN Amyl Nitrite Erythryl Tetranitrate	Headache, throbbing greatly increased by movement, pulsation all over body even to extremities. Mental confusion. Depression and feeling of anxiety. Sickiness, collapse, patient falls down suddenly.	Keep patient lying down and warm. Give 60 m. of liquid ext. of ergot by mouth. Belladonna is most useful for the headache due to nitroglycerin. Oxygen and carbon dioxide; artificial respiration.
OILS, MINERAL Benzoline Paraffin Petroleum	Intense burning pain in mouth, throat and stomach with vomiting which generally has a characteristic paraffin odour. Body cold, face pale, pulse weak. Great thirst and restlessness at night. Often coma.	Stomach tube, or emetic. Stimulants freely. Warmth to extremities. Fresh air.

POISONS	SYMPTOMS	TREATMENT
PARALDEHYDE	Characteristic odour, shortness of breath, pupils contracted, surface of body warm, pulse rapid, unconsciousness may be very protracted.	Stomach tube, using weak sodium bicarbonate solution or emetic. Keep patient warm and awake, but do not walk him about. Ammonia inhalation and strychnine, $\frac{1}{4}$ gr., hypodermically. Nikethamide. Strong coffee and dextrose per rectum. Apply artificial respiration if necessary; oxygen and carbon dioxide.
PHOSPHORUS Rat Pastes	Garlic-like taste in mouth. Characteristic odour. Burning pain in abdomen, intense thirst, vomiting, tendency to hemorrhage, failure of intellect, convulsions not uncommon, ending in coma. May be remission for a few days followed by jaundice, protraction and coma.	Avoid all oils and fats. Stomach tube, using 15 gr. of copper sulphate in 2 gall. of water, or potassium permanganate solution or hydrogen peroxide; or give 8 gr. doses of copper sulphate, dissolved in water, every 5 minutes until vomiting is produced. Then continue with 1 gr. doses every 15 minutes. Give $\frac{1}{2}$ oz. Epsom salts with medicinal charcoal and repeat charcoal frequently. Injection of morphine, $\frac{1}{4}$ gr., for pain, if necessary. Dextrose and alkalis for several days.
SILVER SALTS	Pain in mouth and throat. Lining of mouth likely to be whitened. Vomit contains white flakes which turn black on exposure to light.	Stomach tube, using 2 oz. of sodium chloride in 2 gall. of water or give immediately 2 table-spoonfuls of common salt in a tumbler of water. Inject apomorphine and also give an emetic by the mouth. Give barley water, egg white and milk freely. Nikethamide. Morphine, $\frac{1}{4}$ gr., for pain, if necessary.
STRYCHNINE Nux Vomica	Tetanus-like convulsions. Feeling of suffocation; during paroxysms eyelids prominent, pupils dilated, respiration impeded, pulse feeble and very rapid. Intellect generally clear. Hearing and sight keen. The convulsions do not involve the jaw muscles until late, whereas in tetanus these muscles are affected early.	Stomach tube, but if convulsions have commenced it must be introduced under chloroform. Emetics, e.g., apomorphine, $\frac{1}{4}$ gr., hypodermically. Charcoal or tannic acid <i>ad lib.</i> Give potassium bromide and chloral hydrate. Barbiturates. Patient may be kept under chloroform. Artificial respiration is most important; oxygen and carbon dioxide.

POISONS	SYMPTOMS	TREATMENT
SULPHONAL	Headache, vertigo, confusion of thought, edema of the eyelids and cyanosis. Often cherry-red urine. Collapse and unconsciousness.	Stomach tube or emetic. Give stimulants freely. Nitethimide. Strychnine, $\frac{1}{16}$ gr., and strong coffee. Fluids freely by mouth and dextrose intravenously. Patient must be kept warm and in a recumbent position. Oxygen and carbon dioxide. Artificial respiration if necessary. Lumbar puncture may be necessary.
THALLIUM	Sore throat, pain in stomach, vomiting, constipation. Drowsiness, headache, pains in joints; may be muscular twitchings, tingling, blindness; falling of hair.	Stomach tube, using solution of sodium bicarbonate and sodium thiosulphate. Give purgative. Sodium thiosulphate solution intravenously. Cardiac stimulants.
TURPENTINE	Characteristic odour, thirst, vomiting, diarrhoea, tetanus-like convulsions, pupils contracted, urine has violet-like smell.	Stomach tube, or emetic, $\frac{1}{4}$ gr., anemorphine; give 1 oz. Epsom salts in 4 oz. water. Give milk, barley water, white of egg, and inject morphine, $\frac{1}{4}$ gr.
ZINC SALTS	Corrosion of lips and mucous membrane of mouth. Burning pain in mouth, throat and stomach, incessant vomiting, shortness of breath, quick pulse and breathing, dilated pupils, convulsions and coma.	Stomach tube, with caution, using 60 gr. of potassium permanganate in 2 gall. of water. Give large quantities of bicarbonate of soda in warm water. Keep patient lying down, and apply heat to abdomen. Give abundant quantities of milk, egg white, or olive oil. Give 30 gr. doses of tannin in water. Inject morphine, $\frac{1}{4}$ gr., for pain.

MEDICINAL AND FATAL DOSES OF POISONS

In the following table are shown the smallest quantities of poisons recorded—so far as at present ascertained—as having been taken by adults and followed by fatal results.

Name of Poison	Maximum Medicinal Dose	Minimum Recorded Fatal Dose
Acetanilide	5 grains	120 grains
Acid Acetic, Glacial	—	3 drachms
Acid Acetylsalicylic	15 grains	500 grains
Acid Boric	15 grains	12 grains (baby)
Acid Citric	30 grains	100 grains (adult)
Acid Hydrochloric	—	1 ounce
Acid Hydrocyanic, Diluted	5 minims	1 drachm
Acid Hydrofluoric	—	30 minims
Acid Nitric	—	70 grains
Acid Oxalic	—	2 drachms
Acid Salicylic	10 grains	60 grains
Acid Sulphuric	—	11 grains (child)
Acid Tartaric	30 grains	45 grains (adult)
Aconite Root	2 grains	1 drachm
Aconite, Tincture of	5 minims	1 ounce
Aconitine	$\frac{1}{10}$ grain	30 grains
Alcohol	—	$\frac{1}{2}$ drachm
Allobarbitone	3 grains	$\frac{1}{10}$ to $\frac{1}{5}$ grain
Almond, Bitter	—	3 to 5 ounces
Amidopyrine	10 grains	37 grains
Ammonia, Strong Solution of	—	40 to 50 seeds
Amylal	10 grains (anæsthetic)	120 grains
Aniline	—	1 drachm
Antimony, Tartarated	{ $\frac{1}{2}$ grain as diaphoretic 1 grain as an emetic }	30 grains
Arsenic Trioxide	$\frac{1}{10}$ grain	$\frac{1}{2}$ drachm
Atropine and its Salts	$\frac{1}{60}$ grain	6 drachms
Barbitone	10 grains	{ $\frac{1}{2}$ grain (child) 5 to 15 grains (adult) }
Belladonna Berries	—	2 grains
Belladonna, Liniment of	—	$\frac{1}{2}$ to 2 grains
Belladonna, Liquid Extract of	1 minim	10 grains
Benzene	10 minims	14 berries
Bismuth Subnitrate	20 grains	1 drachm
Bromine	—	1 drachm
Brucine	$\frac{1}{2}$ grain	1 ounce
Calabar Bean	4 grains	120 grains
Camphor	5 grains	2 minims
Cantharides	$\frac{1}{2}$ grain	6 grains
Cantharidin	—	6 beans
Carbon Dioxide	—	20 grains
Carbon Disulphide	—	24 grains
Carbon Monoxide	Permissible Concentration 0.01 per cent.	$\frac{1}{2}$ grain
Carbon Tetrachloride	60 minims	15 per cent. in air.
		4 drachms
		0.4 per cent. fatal in less than an hour
		22 minims

Name of Poison	Maximum Medicinal Dose	Minimum Recorded Fatal Dose
Castor Oil Seeds	—	3 seeds
Chloral Hydrate	20 grains	20 grains
Chlorine	—	1 to 5 per cent. in air
Chloroform	5 minims	4 drachms
Cinchophen	10 grains	37½ grains (i.e., 7½ grains on 5 successive days)
Cocaine	½ grain	1 to 2 grains
Codeine	1 grain	4½ grains
Colchicine	½ grain	1 grain
Colchicum Corm	5 grains	48 grains
Colchicum Seeds	5 grains	60 grains
Colchicum, Wine of	30 minims	3½ drachms
Colocynth Pulp	5 grains	90 grains
Coniine	½ grain	1 drop
Copper Acetate, Basic	—	1 ounce; daily dose 0
Copper Sulphate	{ 2 grains as an astringent 10 grains as an emetic }	1 ounce
Creosote	10 minims	18 drops
Croton Oil	1 minim	20 drops
Croton Seeds	—	4 seeds
Digitalis, Powdered	1½ grains	38 grains
Digitalis, Tincture of	Single dose, 10 grains 15 minims	9 drachms
Digitoxin	Single dose, 90 minims	—
Elaterium	½ grain	1 grain
Ergot (Prepared)	8 grains	1 to 2 drachms
Ether	60 minims	1 ounce
Eucalyptol	3 minims	2½ drachms
Ferric Chloride, Tincture of	15 minims	1½ ounces
Formaldehyde	1 minim	3 ounces
Gelsemium	½ grain	1 grain
Gelsemium, Liquid Extract of	15 minims	35 minims
Gelsemium, Tincture of	½ grain	4 drachms
Glyceryl Trinitrate	—	1 ounce
Hellebore, Extract of	—	1 drachm
Hyoscine Hydrobromide	1½ grain	1 grain
Hyoscyamine	1½ grain	1 grain
Hyoscyamus, Tincture of	1 fl. drachm	4 fl. drachms
Iodine	—	1½ grains
Iodine, Weak Solution of	30 minims	1 drachm
Lead Acetate	2 grains	1 to 2 ounces
Lead Carbonate	—	1 to 2 ounces
Lobelia Herb	3 grains	60 grains
Lysol	—	2 ounces
Magnesium Sulphate	240 grains	2 ounces
Male Fern, Liquid Extract of	90 minims	1½ ounces
Mercuric Chloride (Corrosive Sublimite)	½ grain	3 to 5 grains
Mercuric Oxide, Red	½ grain	20 grains
Mercuric Oxy sulphate (Turpeth Mineral)	½ grain	40 grains
Mercurous Chloride (Calomel)	{ 5 grains as an emetic }	6 grains
Mercury, Ammoniated	3 grains	35 grains
Meta (Metaldehyde)	—	1 ounce
Methyl Alcohol	60 minims	1 ounce
Methyl Salicylate	15 minims	4 fl. drachms
Methylsulphonal	20 grains	340 grains
Morphine and its Salts	½ grain	1 grain
Naphthalene	12 grains	30 grains
Nembutal	{ 1½ grains as hypnotic 7½ grains in obstetrics }	10 grains

Name of Poison	Ma- num Medicinal Dose	Minimum Recorded Fatal Dose
Nicotine	$\frac{1}{2}$ grain	1 to 3 drops
Nitrobenzene	—	8 or 9 drops
Nux Vomica (Dry Extract)	1 grain	3 grains
Nux Vomica (Powdered)	4 grains	30 grains
Oil of Almonds (Essential)	1 minim	17 minims
Oil of Chenopodium	15 minims	45 minims
Oil of Clove	3 minims	$\frac{1}{2}$ ounce
Oil of Eucalyptus	3 minims	57 minims
Oil of Pennyroyal	3 minims	$\frac{1}{2}$ ounce
Oil of Tansy	—	1 to 4 fl. drachms
Oil of Wintergreen	15 minims	1 ounce
Opium (Powdered)	3 grains	4 grains
Opium, Tincture of	30 minims	2 drachms
Phenacetin	10 grains	15 grains
Phenobarbitone	2 grains	90 grains
Phenol	3 grains	60 grains
Phosphorus	$\frac{1}{2}$ grain	$\frac{1}{2}$ to 2 grains
Physostigmine	$\frac{1}{2}$ grain	$\frac{1}{2}$ grain
Picrotoxin	$\frac{1}{2}$ grain	2 to 3 grains
Pilocarpine	$\frac{1}{2}$ grain	2 grains
Potassium Dichromate	$\frac{1}{2}$ grain	120 grains
Potassium Chlorate	10 grains	{ 5 grains (child) 1 ounce (adult)
Potassium Cyanide	$\frac{1}{2}$ grain	5 grains
Potassium Hydroxide	—	40 grains
Potassium Iodide	30 grains	5 grains in "iodism"
Potassium Nitrate	15 grains	120 grains
Potassium Permanganate	3 grains	250 grains
Potassium Quadroxalate	—	$\frac{1}{2}$ ounce
Pyrogallol	—	$\frac{1}{2}$ ounce
Quinine	10 grains	240 grains
Salol	20 grains	15 grains
Santonin	3 grains	2 grains (child)
Silver Nitrate	$\frac{1}{2}$ grain	50 grains
Sodium Fluoride	—	150 grains
Sodium Hydroxide	1 grain	40 grains
Sodium Nitrite	2 grains	3 $\frac{1}{2}$ grains (baby)
Sodium Silicofluoride	—	50 grains
Stramonium, Extract of	1 grain	8 grains
Stramonium Seeds	—	100 seeds (child)
Strychnine and its Salts	$\frac{1}{2}$ grain	$\frac{1}{2}$ to 2 grains
Sulphonal	20 grains	30 grains
Thallium Acetate	$\frac{1}{2}$ grain per lb. b/w	15 grains
Thymol	30 grains (anthelmintic)	40 grains
Turpentine	{ 10 minims $\frac{1}{2}$ fl. ounce as an anthel- mintic }	6 ounces
Veratrum (Hellebore)	—	15 grains
Verdigris (see Copper Acetate)	—	6 grains
Zinc Chloride	—	6 grains
Zinc Sulphate	{ 3 grains 30 grains (emetic dose) }	1 $\frac{1}{2}$ ounces

BIOCHEMICAL ANALYSIS

Chemical Examination of Urine, Blood, Cerebrospinal Fluid, Gastric Contents, and Fæces

Accurate information as to the physical and chemical characters of the body fluids and excreta is often of the greatest importance to the physician, enabling him to confirm the existence of a pathological condition, to follow the progress of an established disease, or to determine the value of a particular method of treatment. The examination of these substances is work for which the pharmacist is peculiarly fitted by his training and medical practitioners are frequently glad to place such work in the hands of pharmacists who are willing to devote to it the requisite time and care. As a rule, information is only required on one or two characters and specific instructions on this point are usually supplied by the physician when sending the material for examination. In the following pages sufficient information is given with regard to the characters on which information is usually sought to enable anyone who is familiar with chemical manipulations to carry out the tests. Some of the more elaborate procedures or those calling for special laboratory facilities have been purposely omitted as also have those requiring close collaboration between the surgeon and the laboratory technician, *e.g.*, the renal function tests. In cases where more information is required than is afforded in these pages reference should be made to works dealing more exhaustively with the subject, such as Harrison's "Chemical Methods in Clinical Medicine" or Hawk's "Practical Physiological Chemistry"; analytical details are also given in Volume II of the "Extra Pharmacopœia".

EXAMINATION OF URINE

There is considerable variation in the urine obtained at different hours of the day and night and for this reason a twenty-four hour specimen is best for routine analysis; failing this, a specimen of early morning urine should be obtained. In the case of female patients, where a microscopical examination is required, a catheter specimen should be obtained if possible.

On receipt of the specimen a note should be made of the colour, appearance and odour (in suppurative diseases the odour is putrid). The reaction should be tested by litmus paper and is normally slightly acid. The specific gravity is determined by means of a specific gravity bottle or hydrometer; if the latter is used the small form known as a urinometer is the most convenient. The specific gravity of normal urine varies from 1.015 to 1.025. It may be high in fevers and diabetes mellitus and is usually low in nephritis and diabetes insipidus. The total solids excreted in the urine of the average healthy adult averages from 950 to 1100 grains a day and may be roughly estimated by multiplying the last two figures of the specific gravity by the number of ounces voided and adding one-tenth of the product, which gives the amount in grains.

Microscopical Examination. In the microscopical examination of urine the most important objects to be looked for are blood cells, epithelial cells, casts, chemical deposits (crystalline or amorphous) and bacteria.

To obtain material for microscopical examination about 100 ml. of urine is left to stand in a conical glass and the supernatant fluid removed after six or seven hours. A drop of the deposit is placed on a slide and after covering with a cover slip is examined under the $\frac{1}{4}$ inch objective of the microscope.

A better method is to centrifuge about 15 ml. of the previously shaken urine, care being taken not to use too high a speed, 1000-2000 revolutions per minute being sufficient.

The supernatant fluid can be removed by boldly inverting the centrifuge tube, sufficient material clinging to the bottom of the tube to make a microscopical preparation.

Blood Cells. Recognition of blood cells can only be achieved by practice, since a purely verbal description of them is quite inadequate. The student is recommended to study known specimens and to consult text-books having the necessary illustrations. Red blood cells are seen as circular discs sometimes showing their bi-concave character when rolling over in the microscopical preparation. The diameter is 0.007 millimetre and they contain no nucleus. The microscope is the most sensitive detector of the presence of blood and a few red blood cells may be recognised when chemical and spectroscopic tests are quite negative. White blood cells are slightly larger than the red cells and if not too far on the way to decomposition show a nucleus. Normally only a very few white blood cells are seen in the urinary sediment.

In a normal male urine not collected by a catheter occasional white blood cells and a few small squamous epithelial cells may be seen. Normal specimens of female urine, unless catheterised, may also contain many epithelial cells and leucocytes and numerous bacteria but these cannot be regarded as of pathological significance as they usually come from the vagina.

Epithelial Cells. Epithelial cells are much larger than the blood cells and usually occur in flat, circular, oval or almost square cells with a well defined nucleus.

Bacteria. Bacteria of the coli group can easily be seen under the $\frac{1}{4}$ inch objective as minute rods often in motion. They are usually, but not necessarily associated, with pus.

Casts. Casts are moulds of the urinary tubules and their presence may be an important indication of renal disease though they may often be found after general anaesthesia and in apparently healthy persons following heavy muscular exercise. There are three types of casts: (1) *Hyaline casts*, which are of uniform shape, with blunt or rounded ends and structureless contents; they may be found in any form of nephritis but may be present in the urine of healthy people; (2) *Cellular casts*, which are characterised by adhering red blood cells or epithelial cells and indicate acute nephritis; (3) *Cylindroids*, which are transparent ribbon-like bodies, longer and narrower than casts and which are found in inflammations of the urinary tract.

To find casts the centrifugal deposit is examined first with the $\frac{3}{8}$ and then with the $\frac{1}{4}$ inch objective. They have a sharp outline and their cylindrical shape may be shown by oblique illumination.

Crystals. Crystals of uric acid or calcium oxalate may be present in an acid urine, but can be accepted as normal unless present in great numbers. Alkaline urine may show a deposit of amorphous phosphates, but crystalline phosphates usually suggest a decomposing or infected urine, the latter being confirmed by the presence of pus and bacteria.

Acetone and Acetoacetic Acid

When the body cannot get or cannot assimilate its proper share of carbohydrate, as in persistent vomiting, starvation or diabetes, it tries to make up the deficiency by burning up the body fats and as its capacity for such combustion is limited, the products of incomplete combustion such as β -hydroxybutyric acid, acetoacetic acid and acetone result. This condition is known as ketosis and these substances pass from the blood to the urine.

Although β -hydroxybutyric acid represents about 75 per cent. of the total ketone bodies in the urine no satisfactory qualitative test is known and the tests employed for the detection of acetone bodies are tests for acetone and acetoacetic acid. Acetone is the most frequently encountered ketone body in the urine and is usually the only one found alone.

ROTHERA'S TEST.—Shake about 10 ml. of the urine with ammonium sulphate crystals until saturated, add a few drops of freshly prepared 5 per cent. solution of sodium nitroprusside and excess of solution of ammonia. A purplish-red colour appears in a few minutes if acetone or acetoacetic acid is present.

GERHARDT'S TEST.—Add to the urine, ferric chloride solution drop by drop until no more precipitate of phosphate is formed. Filter and add a few more drops of ferric chloride solution. A red colour is developed if acetoacetic acid is present. Acetone does not give this test. To distinguish the acetoacetic reaction from that given by salicylates, boil about 10 ml. of urine in a beaker down to half its bulk, cool and make up to the original volume with water. Repeat the ferric chloride test.

If the original test was due to the presence of acetoacetic acid it will now be negative as acetoacetic acid is converted into acetone and driven off by the boiling. Salicylates and other bodies capable of reacting with ferric chloride will remain and the test will be approximately the same in the boiled and the original specimens. The nitroprusside test is given by both acetoacetic acid and acetone. It is an extremely sensitive test and too much importance must not be attached to a weak or moderate reaction. If the test is negative it is a waste of time to apply any other test for the presence of acetone bodies.

The ferric chloride test is relatively insensitive and therefore a positive reaction, meaning the presence of appreciable quantities of acetone bodies, is important. A positive ferric chloride test with a negative nitroprusside test cannot be due to the presence of acetone bodies.

Albumin

Albumin in urine means the presence of the blood proteins albumin or globulin. As a general rule these are both classed as "albumin", their differentiation being necessary only in special circumstances.

The presence of albumin is generally of pathological significance, but occasionally small amounts of protein, consisting chiefly of globulin, are passed by young healthy persons. In pathological conditions, albuminuria is nearly always accompanied by casts and under these circumstances it points to organic disease of the kidney or to severe irritation or circulatory changes in the kidney.

Mucin is a protein frequently occurring in urine and as it has no pathological significance it must not be confused with albumin.

Qualitative Tests. Before applying any tests for protein the specimen must be made quite clear by filtration.

BOILING TEST.—A test tube should be two-thirds filled with urine and the upper layers brought to the boiling-point. Any coagulum or turbidity suggests the presence of albumin. To the boiled liquid one or two drops of 33 per cent. acetic acid are added, sufficient to render the sample just acid. If the coagulum disappears on the addition of the acid it is due to precipitated phosphates. Sometimes the coagulum does not appear until after the addition of the acid.

Very alkaline urines should be made faintly acid with acetic acid before applying the boiling test.

SALICYLSULPHONIC ACID TEST.—A few drops of 10 per cent. or 20 per cent. solution of salicylsulphonic acid added to a few ml. of urine give a white precipitate or turbidity with all proteins and this may be used as a confirmatory test. (It should be noted that the urine of patients who have been treated with iodoxy give a false positive reaction with this test.)

Quantitative Test. This is most conveniently carried out by means of Esbach's albuminometer which consists of a graduated tube, the graduations corresponding to parts of albumin per 1000 ml. of urine. Urine is placed in the tube up to the mark 'U' and Esbach's reagent added to the mark 'R'. The tube is inverted several times to ensure thorough mixing and set aside in the vertical position for twenty-four hours. The column of precipitated protein is then read against the graduations. Esbach's reagent consists of 10 g. of picric acid and 20 g. of citric acid in one litre of water. Urines with a high specific gravity should be diluted until their specific gravity is about 1.015 and the necessary correction made for dilution. The results are only approximate and are of more value for purposes of comparison than for exact protein determination.

A quicker method is that employing the Aufrecht tube, the advantage being that the precipitate is thrown down by means of a centrifuge in the special graduated tube, the whole determination taking only a few minutes. Accurate determinations of protein in urine are rarely required but, if necessary, may be carried out by precipitating the protein from the urine by salicylsulphonic acid or trichloroacetic acid, collecting the precipitate, washing and estimating the nitrogen content of the precipitate by Kjeldahl's method. The nitrogen can be converted into terms of protein by multiplying by the factor 6.3.

Bile Pigments

The presence of bile pigments in urine is usually indicated by the deep orange colour and by the fact that when shaken this colour is

imparted to the froth. Together with bile salts their presence is significant of some derangement of hepatic functioning. It is a waste of time to test very pale urine for the presence of bile pigments.

IODINE TEST.—Dilute some tincture of iodine with four times its volume of water. By means of a pipette run this on to the surface of some urine in a test tube so that the liquids do not mix. A green colour at the junction of the layers will result if bile pigments are present.

GMELIN'S TEST.—Place about 2 ml. of fuming nitric acid in a test tube and by means of a pipette carefully layer some urine on the surface. If bile pigments are present a play of colours will be produced at the junction of the liquids. It will not persist for more than a few minutes. The results must not be accepted as positive unless one of the colours is green. A modification of the test can be carried out as follows:—Filter some urine several times through the same filter paper and after it has drained spread the paper out on a flat surface and drop one or two drops of fuming nitric acid in the centre. Rings of colour spreading from the centre, one of which is green, will be proof of the presence of bile pigments.

Bile Salts

Bile salts usually occur in urine in association with bile pigments and it is seldom necessary, therefore, to test for bile salts.

HAY'S SULPHUR TEST.—Sprinkle a little dry flowers of sulphur on to the surface of some urine in a wide test tube or beaker. Normally the sulphur will float but if bile salts are present the surface tension will be lowered and the particles of sulphur will be seen streaming steadily to the bottom.

PETTENKOFER'S TEST.—To about 5 ml. of urine is added a few drops of 5 per cent. cane sugar solution and concentrated sulphuric acid is poured down the side of the tube to form a lower layer. A red ring at the junction of the liquids indicates the presence of bile salts. The tube must be cooled if necessary to prevent the temperature rising above 20°.

Blood

Gross amounts of blood in urine give it a characteristically "smoky" appearance, but small amounts cannot be detected by the naked eye. The presence of small amounts of blood in urine may be detected by microscopical examination of the centrifuged deposit and spectroscopic examination will show characteristic absorption bands of oxyhæmoglobin, unless the specimen is old.

AMIDOPYRINE TEST.—To a few ml. of urine add one or two drops of acetic acid and on the surface pour gently about a half inch layer of a 5 per cent. solution of amidopyrine in alcohol. Drop in 2 or 3 drops of solution of hydrogen peroxide. If blood is present a mauve ring will appear at the junction of the two liquids, and, if much blood is present the coloration will gradually spread up into the alcoholic layer.

Iodides will give a similar test and their presence must be excluded by testing the urine with nitric acid and solution of starch; or by adding strong nitric acid to urine and shaking out with a little chloroform when the purple colour of the liberated iodine will be seen in the chloroform layer.

Calculi

The organic and inorganic constituents of the urine are sometimes precipitated in the urinary tract and if a suitable nucleus is available, the precipitated material may give rise to a stone, the size of which depends on the region of the urinary tract in which it forms. Calculi may be formed and remain in the kidney. Small stones leaving the kidney may become lodged in the ureter or pass into the bladder. In the bladder these stones, if very small, may be voided in the urine or may increase in size by continuous deposition of fresh material. The common forms of urinary calculi are composed of calcium oxalate, magnesium ammonium phosphate, calcium phosphate, ammonium urate or uric acid. Sometimes a stone consists almost entirely of one of these substances but more often a change in reaction of the urine or the presence of infection results in the outer layers being of a different composition from the nucleus. The phosphatic stones are usually associated with an alkaline and infected urine. Uric acid is usually precipitated in a very acid urine while calcium oxalate may occur in both acid and alkaline media.

It is not usually necessary to give an exact analysis of a urinary calculus; it is sufficient to indicate if the stone is chiefly composed of urates, uric acid, oxalate or phosphate, since subsequent medication, with a view to altering the reaction of the urine, is based on these findings. Before analysis, the stone should be cut in half so that any variation between nucleus and exterior may be noted. Unless there is some reason for its preservation a small stone may be crushed and a sample of the mixed powder examined.

Qualitative Tests. The first step in the analysis is to determine if the chief constituent of the stone is organic or inorganic by heating a small portion on platinum foil. All calculi will show evidences of the presence of some organic matter, since in their formation they are bound to include small quantities of the cellular, protein, or possibly bacterial content of the urine. If the stone is chiefly organic it will burn away leaving practically no ash. This occurs with uric acid and ammonium urate stones. Calcium oxalate usually burns to a grey ash which will give a red colour when moistened with hydrochloric acid and tested by means of the platinum wire flame test. Calcium phosphate and ammonium magnesium phosphate stones contain little organic matter and yield a high proportion of ash. The presence of calcium phosphate cannot be detected by means of the flame test.

To distinguish between calculi consisting chiefly of phosphate or oxalate and those consisting chiefly of uric acid, a little of the powder is boiled with equal parts of concentrated hydrochloric acid and water. Phosphate and oxalate will dissolve readily but uric acid will remain practically insoluble. Uric acid may be confirmed by its ready solubility in solution of lithium carbonate and by the Murexide test.

MUREXIDE TEST.—A small quantity of the powder is heated in an evaporating dish with 3 or 4 drops of concentrated nitric acid. In the presence of uric acid, a red colour develops which changes to mauve on the addition of 40% solution of sodium hydroxide.

If the calculus or a part of it dissolves in hydrochloric acid it should be filtered from any organic debris and made alkaline with ammonia. Both phosphates and oxalates will be precipitated. To this precipitate,

without filtering, add excess of 33 per cent. acetic acid. The phosphate will readily dissolve but calcium oxalate will remain insoluble.

If it is desired to distinguish between calcium phosphates and ammonium magnesium phosphates an ordinary analytical phosphate separation may be carried out. The original powder may be boiled with a little 20 per cent. sodium hydroxide, when the ammonium magnesium phosphate will be detected by the ammonia evolved.

A rare form of calculus is sometimes seen in the form of cystine. This is, of course, wholly organic. It is soluble in weak ammonia from which solution it crystallises in characteristic hexagonal plates. It is insoluble in diluted acetic acid and if boiled with lead oxide and caustic soda gives a black precipitate of lead sulphide due to the sulphur contained in its molecule.

Indican

The substance known as indican met with in urine is potassium indoxyl sulphate. It results from the decomposition of tryptophane present in proteins. Indole is formed in the intestine and after absorption is detoxicated by the liver by conjugation with sulphuric acid. Normally there are only traces to be found in the urine. When present in excess it indicates abnormal protein decomposition and this is usually occurring in the large intestine but occasionally is due to the decomposition of accumulated pus in some other part of the body. Only fairly gross amounts are of pathological significance.

TEST FOR INDICAN.—Mix 10 ml. of concentrated hydrochloric acid with an equal volume of urine. Add about 2 ml. of chloroform and one drop of hydrogen peroxide solution. Mix by repeated inversion. Any indoxyl present will be oxidised to indigo blue which will dissolve in the chloroform. Iodides in the urine will give the characteristic purple colour of iodine to the chloroformic layer and can be easily decolourised by a little sodium thiosulphate. Indigo blue is not affected.

Sugar

Glucose is the most frequently occurring carbohydrate in urine and sugar in urine is usually understood to be glucose unless otherwise stated.

In a case of suspected glycosuria the time of collection of the urine is most important because excretion of sugar in the urine is dependent upon the level of sugar in the blood and this in its turn is dependent upon the amount of carbohydrate taken in by the mouth. A mild case of diabetes would probably not have sugar in a specimen of urine passed in the early morning but in one passed one or two hours after a heavy meal there might be a very high sugar content. For this reason the best time to detect sugar is in a specimen passed about two hours after the heaviest carbohydrate meal of the day. Quantitative determinations should be made on a sample of the mixed twenty-four hours excretion, the total volume of which is known.

Glucose is detected in urine by its reducing properties and most reagents are designed to show reduction changes with a degree of sensitivity such that, while pathological amounts are detected, minute traces which occur normally do not give a reduction. Other reducing substances normally present in urine also fail to give reduction unless

in a sufficiently high concentration. The reducing substances other than glucose which may cause reduction are:—

1. URIC ACID AND CREATININE.—These only cause difficulty when found in high concentration. A very slight or doubtful reduction in a deep orange coloured, very acid urine with a high specific gravity would probably be due to these substances.

2. LACTOSE.—This may be present in the urine during pregnancy and lactation.

3. GLYCURONIC ACID.—The presence of this substance is more a theoretical possibility than a real occurrence, but it is occasionally found in small quantities after taking very large doses of drugs such as salicylates and chloral. A very slight reduction in a urine giving a marked reaction for salicylates should be suspect until the presence of glucose is confirmed.

4. PENTOSE.—These occur in small quantities as a persistent abnormality in the urine of some people and the quantity is not influenced to any extent by the carbohydrate intake as in the case of glucose. Pentoses have a number of colour reactions which serve to identify them and unlike glucose they are not fermented by yeast.

Qualitative Tests. Fehling's solution, if kept as the two separate solutions, is still counted a useful reagent. Equal quantities of solutions 1 and 2 should be mixed just before using.

About 5 ml. of Fehling's solution and 5 ml. of urine are boiled separately in test tubes and the boiling urine added to the Fehling's solution. No further boiling should be done. A positive result is shown by the formation of a red or yellow precipitate of cuprous oxide. A green discoloration should be disregarded.

BENEDICT'S (QUALITATIVE) REAGENT.—This is made by dissolving 173 g. of sodium citrate and 100 g. of anhydrous sodium carbonate in about 600 ml. of water. To the solution is added, with constant stirring, 17.3 g. of copper sulphate dissolved in about 200 ml. of water. The solution is made up to one litre and filtered if necessary. It keeps practically indefinitely. To use this reagent with success it is advisable to measure accurate proportions of urine and reagent. To 5 ml. of Benedict's solution is added 0.25 ml. of urine and the mixture thoroughly boiled for at least a minute.

A positive result is shown by a green, yellow, or red precipitate and if the measurements have been accurate the following very approximate quantitative estimation may be made, the appearance being judged immediately after boiling:—

Green opalescence	..	0.1 to 0.5 per cent. of glucose
Green precipitate	..	0.5 to 1 per cent. of glucose
Yellow precipitate	..	1 to 2 per cent. of glucose
Red precipitate	..	Over 2 per cent. of glucose

If the urine has not been measured accurately, it is advisable to neglect anything less than a yellow precipitate as an excess of urine will cause a precipitate of phosphates in the alkaline medium simulating the green precipitate mentioned above.

The advantage of Benedict's reagent is that it is less likely to give false positive reactions with substances like uric acid and creatinine.

NYLANDER'S REAGENT.—Dissolve 40 g. of Rochelle salt and 20 g. of bismuth subnitrate in 1000 ml. of 8 per cent. w/v NaOH. For use add one part of reagent to five parts of urine and boil thoroughly. Reduction is shown by the appearance of a black precipitate. Albumin, if present in the urine, must be removed before applying, since it gives a similar precipitate.

This is a good reagent but unless the black precipitate appears within ten minutes after boiling it should be disregarded. When there is doubt as to the identity of the reducing substance the following additional tests are necessary.

FERMENTATION TEST.—A sample of brewers' yeast should be shaken up with excess of water and filtered to remove any soluble reducing substances. A fragment of the washed yeast is then mixed with about 10 ml. of the urine, previously boiled, filtered and cooled. This mixture is then introduced into a 'U' tube, one side of which is longer than the other and is closed. The tube is completely filled with the liquid and then kept at a temperature of 37° in an upright position for three to four hours. If glucose is present bubbles of gas will collect at the closed end of the tube and the gas can subsequently be proved to be CO₂ by its ready solubility when strong sodium hydroxide solution is introduced into the tube. Control tests should be made on normal urine and also urine known to contain glucose to avoid errors due to inactive yeast or gas production from other substances in the yeast. The test is simple and valuable in that positive results are not given by lactose, pentoses or glycuronates.

OSAZONE FORMATION BY PHENYLHYDRAZINE TEST.—Sufficient phenylhydrazine hydrochloride to cover a sixpence, about three times as much sodium acetate and 2 ml. of glacial acetic acid are mixed and added to 10 ml. of urine. The mixture is warmed and filtered. The clear filtrate is then placed in a boiling water-bath for 30 minutes and then the bath and contents allowed to cool slowly. Glucose will yield yellow crystals of glucosazone readily recognisable microscopically by their arrangement in stars and sheaves. Lactose yields a characteristic osazone the crystals of which form in yellow sheaves or clusters. The osazones of pentoses and glycuronates are obtained with difficulty and can only be distinguished with certainty from glucosazone by their melting-points.

Amounts of glucose over 0.5 per cent. may be recognised and determined by means of the polarimeter but most specimens require the removal of urinary pigment with lead subacetate prior to examination.

Quantitative Test. Benedict's quantitative reagent is the most suitable for the purpose as long as it is realised that the reduction is slow and that a preliminary titration is essential to get the approximate reading.

BENEDICT'S QUANTITATIVE TEST. The reagent is prepared as follows:—

Sodium Citrate	200 g.
Sodium Carbonate (Crystals) ..	200 g.
Potassium Thiocyanate	125 g.

Dissolve in 800 ml. of water and filter. Dissolve 18 g. of pure copper sulphate in 100 ml. of water and add to the alkaline solution a little at a time and with constant shaking. The final volume is adjusted to 1000 ml. with water. Twenty-five ml. of this solution is equivalent to 0.05 g. of glucose.

The determination of glucose is carried out as follows: 25 ml. of the reagent are placed in a conical flask with a few porcelain chips or glass beads to avoid bumping, 4 to 5 g. of anhydrous sodium carbonate are added and the solution brought to the boil. Urine is run in from the burette, the boiling being steadily maintained until the blue colour is discharged. If necessary hot water may be added to replace loss due to prolonged boiling. A reading of less than 5 ml. indicates the necessity of diluting the urine before titration. The best results are obtained when the reading is between 8 and 12 ml. 25 ml. of the reagent is reduced by 0.05 g. of glucose so that the percentage of glucose in the specimen is given by $\frac{5}{x}$ where x is the number of ml. of urine used in the titration.

It is important that the two Benedict reagents are not confused as the qualitative reagent is not suitable for quantitative work and *vice versa*.

Fehling's solution may be used quantitatively, 10 ml. being equivalent to 0.05 g. of glucose. The end-point is sometimes obscured by the precipitated cuprous oxide and this makes it a little difficult to decide when the titration is complete. This difficulty is overcome by practice.

Take 10 ml. of mixed Fehling's solution, 20 ml. of water and 10 ml. of 20 per cent. NaOH. The solution is titrated at the boiling-point and the disappearance of the blue or green colour taken as the end-point. Re-oxidation is very rapid with Fehling's and the titration must not be unduly prolonged. The calculation is the same as for the Benedict method, namely, five divided by the number of ml. of urine being equivalent to the percentage of sugar present.

Urea

The usual method of determination is based on the decomposition of urea with the production of carbon dioxide and nitrogen. The carbon dioxide is absorbed in an excess of alkali and the volume of nitrogen measured from which the percentage of urea can be calculated.

SODIUM HYPOBROMITE METHOD.—An alkaline solution of sodium hypobromite is prepared by dissolving 400 g. of sodium hydroxide in water and making up to 1 litre; 9 ml. of this solution is mixed with 1 ml. of bromine when required, as the mixed liquid does not keep very well. When this solution of sodium hypobromite is added to urine it is found that the nitrogen produced only corresponds to about 92 per cent. of the amount of urea actually present. If, however, the gas is measured at the usual laboratory temperature of about 18° (65.4°F.), its volume is about 8 per cent. greater than it would be at the standard temperature of 0°; therefore by omitting to make a correction for temperature and calculating from the volume of gas actually collected, a very nearly correct figure is obtained for the amount of urea. If, however, sugar is present in any considerable quantity, practically the whole of the nitrogen is liberated; with diabetic urine, therefore, if temperature correction is omitted, 8 per cent. should be deducted from the volume of gas measured.

The simplest method of making the determination is to employ the ordinary nitrometer. The nitrometer is first filled with brine to the tap; 5 ml. of urine is then placed in the cup and carefully introduced, and the cup rinsed with a few drops of water, this being also admitted by the tap. A mixture of 10 ml. of hypobromite solution and

10 ml. of water is then introduced in the same way, and nitrogen is at once evolved; when the reaction has nearly ceased, the flexible tube of the nitrometer is closed with a clip and the liquids mixed well by shaking the tube. When the evolution of gas has ceased and the temperature become constant, the liquid in the two tubes of the nitrometer is brought to the same level and the volume of gas read off. Each ml. of nitrogen represents 2.5 milligrams of urea. If a nitrometer is not available, the hypobromite solution may be put into a flask and the urine measured into a small test tube, which is also placed in the flask; the latter is then closed with a cork through which passes a glass tube, communicating by means of india-rubber tubing with another glass tube passing through a cork in the top of an ordinary burette without tap, or with the tap open; a long piece of india-rubber tubing connects the nozzle of the burette to a funnel, which is held by a clamp at a convenient height. The cork at the top of the burette is removed and water poured in through the funnel until it reaches the zero mark; the cork is then replaced tightly. The flask containing the hypobromite and urine is now inclined, so that the latter runs out of the tube and the two liquids mix; when most of the nitrogen has been evolved the flask is well shaken; after the reaction is complete, the position of the funnel is adjusted so that the water stands at the same height in the burette and the funnel, and the volume of gas is then read off.

If, instead of urea, the total nitrogen of all the constituents of the urine is required, a determination must be made by Kjeldahl's method in the usual manner.

Urobilin

Urobilin is a yellow pigment normally present in the faeces where it is known as stercobilin. It is not normally present in urine in more than very small amounts and its presence in any quantity usually indicates a degree of liver disturbance. It may be present as the pigment, in which case the urine is usually a deep orange colour, or it may be present as the colourless chromogen, urobilinogen.

SCHLESINGER'S TEST.—In a test tube, place 10 ml. of the suspected urine and add 1 drop of tincture of iodine. Make a saturated solution of zinc acetate in alcohol in another tube with about 1 g. of zinc acetate and 10 ml. of alcohol. Mix the two thoroughly by pouring one tube into the other several times. Filter. If urobilin is present the filtrate will be yellow or pink in transmitted light but with reflected light will show a very striking green fluorescence. Only an obvious positive result is of any significance.

EXAMINATION OF BLOOD

The average value of blood volume is about 85 ml. per kilo bodyweight. Determinations are based on the principle that if a definite quantity of a known substance (*e.g.*, congo red) is added to the circulation, the blood volume can be calculated from the concentration of the added substance in a sample of blood. As these methods involve technique and apparatus outside the normal scope and experience of the student or practising pharmacist, they are not given in detail here.

Enumeration of Corpuscles

The normal content of red corpuscles in man is about 5,000,000 to 6,000,000 per cubic millimetre, the figure in woman being about

4,500,000. In adults the average number of white corpuscles per cubic millimetre is 5,000 to 10,000; in children the range is somewhat higher.

Red Cell Count. The hæmocytometer chiefly used is the Thoma-Zeiss or Thoma-Hawksley. This consists of a micrometer slide divided into 16 squares, each again being divided into 16 smaller squares. It has two pipettes, one for diluting the blood 1 to 100, for counting the red corpuscles, while the other which dilutes the blood 10 times is intended for estimation of the leucocytes. The number of red corpuscles seen in 4, 6, or, if great accuracy is required, 16 larger squares, *i.e.*, in 64, 96 or 256 smaller squares is counted. The volume of the cube standing on each small square is $\frac{1}{256}$ cubic millimetre.

The number of red blood cells in 1 cubic millimetre of blood is calculated by multiplying the total number of corpuscles counted by 4000 times the number of times of dilution of the blood, and dividing by the number of small squares in which the corpuscles were counted. In counting, the corpuscles overlapping two adjacent boundary lines of the upper left-hand corner of the square are included and those overlapping the remaining two sides are excluded.

HAYEM'S SOLUTION is commonly employed as a diluting fluid. This consists of sodium chloride 2, sodium sulphate 5, and mercuric chloride 0.5 in water 200.

White Cell Count. Leucocytes may be enumerated in a similar manner, but in this case it is desirable to use a stain. For this purpose, a suitable diluting fluid may be prepared by adding an appreciable quantity of Löffler's methylene blue to Gower's solution.

GOWER'S SOLUTION.—Sodium sulphate 5.42 g., acetic acid 3.125 mL, distilled water 100 ml. Filter.

An alternative diluent consists of a 3% aqueous solution of acetic acid tinted with methylene blue or gentian violet. By means of this solution the red blood cells are rendered invisible, whilst the leucocytes remain visible and a dilution of blood 1 to 10 may be used.

Hæmoglobin

Normal blood contains, on an average, 14.5 g. of hæmoglobin per 100 ml. The determination of hæmoglobin is one of the most important of the chemical tests applied to blood.

Of the methods used for the determination of hæmoglobin, the simplest and most commonly used depends upon the production of carboxy-hæmoglobin by interaction between carbon monoxide and a dilution of the blood, and comparison of the red colour produced against standard tubes.

Carbon Monoxide Method. Haldane's modification of Gower's method is the best known. A specially provided graduated tube is filled to the mark 10 with distilled water and 20 cubic millimetres of blood added. A stream of coal gas is passed over the blood for a few minutes to convert all the hæmoglobin to carboxyhæmoglobin. The tube is then matched against the standard tube provided and water added to the dilution until the intensities of colour are identical. The hæmoglobin content is expressed as a percentage, the normal content of 14.5 g. per 100 ml. corresponding to 105% on the Haldane scale.

Colour Index. This is a useful figure which indicates corpuscular richness and is of use in distinguishing between different types of anæmia. For the purpose of calculating the colour index, the normal content of 5,000,000 red blood corpuscles is taken as 100%. The actual count is expressed as a percentage of this figure and the value obtained is divided into the hæmoglobin content expressed as a percentage on the Haldane scale.

$$\text{Thus, colour index} = \frac{\text{Hæmoglobin content}}{\text{Red cell count expressed as a percentage of 5,000,000.}}$$

Sedimentation Rate

This test is constantly in use in hospitals in assessing the activity of various infections, notably, tuberculosis, chronic rheumatism and rheumatoid arthritis. 1·6 ml. of blood is drawn into a syringe containing 0·4 ml. of 3·8% sodium citrate solution to prevent coagulation. The mixture is emptied into a specimen tube and is drawn up into a standard Westergren tube (2·5 mm. diameter) to the zero mark which is 200 mm. from the tip. After the tube has been allowed to stand in a vertical support for 1 hour, a reading is taken of the level of the red cell column. The normal rate for men at the end of 1 hour is 3 to 5 mm. and for women, 4 to 7 mm. These rates are much increased in active infections and a correction should be made if the patient is suffering from a severe degree of anæmia.

Sugar

The normal sugar content of the blood, fasting or at least five hours after any meal, is between 0·08 per cent. and 0·11 per cent. The ingestion of carbohydrate tends to raise the blood sugar and in the case of easily assimilable carbohydrate such as glucose, the rise is very constant in time and level. After 50 g. of glucose, the normal individual's blood sugar rises to about 0·17 per cent. in 30 minutes, falls to about 0·13 per cent. in one hour and is back to the fasting level in two hours. Normally it is not possible to force the blood sugar above this level and the return is always fairly rapid.

In diabetes the storage capacity of the body is deficient and the blood sugar rises to abnormal levels; when it is above about 0·18 per cent. sugar is excreted in the urine. A severe case of diabetes will have a raised blood sugar practically at any time. A mild case will only show the rise at certain periods after a meal, therefore it is important to know the time of blood collection with relation to meals.

Blood sugar soon disappears from drawn blood owing to the action of a glycolytic ferment, therefore it must be examined within an hour or so of collection or a special preservative must be used to prevent glycolysis. A useful preservative is a mixture of 10 parts of sodium fluoride and 1 part of thymol; 0·1 g. of the mixture will preserve 10 ml. of blood for a week. Blood preserved in such a way is not suitable for the determination of urea by the urease method.

For the determination of blood sugar 0·1 ml. of blood is placed in 3·5 ml. of water and the proteins precipitated by the addition of 0·2 ml. of 10 per cent. sodium tungstate and 0·2 ml. of $\frac{1}{2}$ normal H_2SO_4 . The mixture, after shaking and allowing to stand for a few minutes, is filtered through a small

filter paper and 2 ml. of the water-clear filtrate (representing 0.05 ml. of blood) is placed in a tube and mixed with 2 ml. of alkaline copper solution. The mixture is placed in a boiling water-bath for six minutes. During this time the alkaline copper solution will be reduced in proportion to the amount of sugar present. The tube is removed from the water-bath and 2 ml. of phosphomolybdic acid is added. This is reduced to a blue compound by the cuprous oxide and the intensity of the blue colour is proportional to the amount of sugar present in the original blood. The solution is diluted to 12.5 ml. and its colour compared with a standard sugar solution prepared by boiling 1 ml. of standard sugar solution with 2 ml. of the alkaline copper solution; the subsequent addition of phosphomolybdic acid and dilution being the same. The comparisons are carried out as described under urea but in the calculation as 1 ml. of standard sugar solution = 0.0002 g. of glucose, the colorimeter calculation will be:—

$$\frac{\text{Reading of standard}}{\text{Reading of unknown}} \times 0.0002 \times \frac{100}{0.05}$$

The reagents mentioned in the above analysis are made as follows:

ALKALINE COPPER SOLUTION.—Dissolve 40 g. of anhydrous sodium carbonate in about 400 ml. of water and transfer to a litre flask. Add 7.5 g. of tartaric acid and 4.5 g. of pure crystalline copper sulphate previously dissolved in about 100 ml. of water; mix and make up to 1 litre.

PHOSPHOMOLYBDIC ACID SOLUTION.—Dissolve 35 g. of molybdic acid and 5 g. of sodium tungstate in 200 ml. of 10 per cent. sodium hydroxide and 200 ml. of water. Boil the solution vigorously in a litre flask, or beaker, for about 30 minutes until there is no more ammonia being expelled. Cool and transfer to a 500 ml. graduated flask, washing in from the beaker until the volume is about 350 ml. To this add 125 ml. of 85 per cent. phosphoric acid and make up to 500 ml. with water.

STOCK SUGAR SOLUTION.—Prepare a saturated solution of benzoic acid by adding 2.5 g. to a litre of boiling water, allowing to cool and filtering if necessary. Dissolve 1 g. of pure dry dextrose in 100 ml. of the saturated benzoic acid.

The stock solution will keep almost indefinitely.

STANDARD SUGAR SOLUTION.—Stock sugar solution 2 ml., saturated benzoic acid solution to 100 ml.; 1 ml. of this solution contains 0.0002 g. of dextrose.

Urea

As urea is the normal excretion product of the kidneys, any interference with normal kidney function by disease, such as nephritis or the presence of stones, usually results in an inability to excrete urea properly. The resulting accumulation of urea in the blood is used as an indication of the presence and degree of kidney damage. The normal amount of urea present ranges from 0.02 per cent. to 0.04 per cent., that is, 20 to 40 milligrams per 100 ml. of blood. The urea content does not fluctuate to any great extent during any one day and the specimens of blood may, therefore, be collected practically at any time.

Blood may be obtained by a finger prick, the quantity required being only 0.2 ml. It is usual to run the blood from the finger into a tube containing a few milligrams of neutral potassium oxalate to prevent clotting. The method of determination is as follows:—

0.2 ml. of blood is measured accurately in a capillary pipette and added to 1 ml. of water. To this mixture is added 0.3 ml. of solution of urease made by dissolving one Dunning's urease tablet in 10 ml. of water. The mixture is kept at a temperature of 50°–60° for 15 minutes in a water-bath. The incubation results in the urea being converted into ammonium carbonate by the ferment urease. To the mixture is added 0.3 ml. of 10 per cent. sodium tungstate and 0.3 ml. of $\frac{1}{2}$ normal H_2SO_4 . The mixture is shaken and these reagents precipitate all the proteins present. The liquid is then diluted to a final volume of 8 ml. by the addition of 5.9 ml. of water. The mixture is then allowed to stand, or better centrifuged, to bring down the protein precipitates. (Filtration can be used but only if the filter papers can be guaranteed to be free from any traces of ammonia.) 5 ml. of the supernatant fluid (equivalent to 0.125 ml. of original blood) are diluted with 5 ml. of water and to the mixture 2 ml. of Nessler's reagent is added. The resulting brown colour is proportional in intensity to the amount of ammonia present which in its turn is proportional to the amount of urea present in the original blood. This colour is compared with a standard colour produced by adding 2 ml. of Nessler's reagent to 1 ml. of standard ammonia solution (see below) previously diluted with 9 ml. of water. 1 ml. of the standard ammonia solution treated in this way gives a colour corresponding to 0.0001 g. of urea.

Comparison of the colours of the standard and the unknown solutions may be best made in a colorimeter.

$$\frac{\text{Reading of Standard}}{\text{Reading of Unknown}} \times 0.0001 \times \frac{100}{0.125} = \% \text{ of urea in original blood.}$$

If a colorimeter is not available, comparison may be made in two tubes of equal diameter, one of them being graduated in divisions of not less than 0.2 ml. The coloured unknown solution is placed in the plain tube and exactly 5 ml. of the coloured standard is placed in the graduated tube. Water is then added to the latter until the colours match. If v ml. is the final volume of diluted liquid in the graduated tube, then

$$\frac{5}{v} \times 0.0001 \times \frac{100}{0.125} = \% \text{ of urea in original blood.}$$

If, as may happen in a case of a very high blood urea, the unknown is a darker colour than the standard, the standard must be put in the plain tube and 5 ml. of unknown in the graduated tube. In the above equation 5 and v must then be transposed.

As the final result depends upon the formation of small quantities of ammonia, all reagents and the distilled water used must be ammonia-free. The water and reagents used may be tested for absence of ammonia by addition of Nessler's solution; no yellow or brown colour should be produced.

THE STANDARD AMMONIA SOLUTION.—

Stock Standard Solution	..	5 ml.
Water	..	to 100 ml.

Stock standard solution is made by dissolving 4.4 g. of pure ammonium sulphate in water to 1 litre.

EXAMINATION OF CEREBROSPINAL FLUID

Cerebrospinal fluid is normally a clear colourless fluid having a faintly alkaline reaction and containing no clot. The sugar content varies with the level of the blood sugar and normally ranges from 40 to 80 mg. per 100 ml. The total protein content is from 10 to 35 mg. per 100 ml. and globulin is absent. Chlorides, calculated as NaCl, are present to the extent of 700 to 750 mg. per 100 ml. The urea content is from 10 to 40 mg. per 100 ml. and varies with the blood urea.

A microscopical examination should be carried out on the centrifuged deposit for the presence of cells and bacteria. The presence of a clot indicates that the fluid contains fibrinogen and is always of pathological significance, unless blood has been admixed at the time of lumbar puncture.

Chlorides

Chlorides may be determined by direct titration with N/50 AgNO₃, using potassium chromate as indicator. Chloride determinations are particularly of value in the early diagnosis of tuberculous meningitis, since in this condition the chloride content is very low, ranging from 500 to 650 mg. per 100 ml.

Protein

Total protein may be determined by a turbidity method in which the protein is precipitated by addition of 30% trichloroacetic acid and the resulting turbidity matched against a series of standard tubes.

Qualitative Test for Globulin. A small quantity of the cerebrospinal fluid is added to an equal volume of saturated ammonium sulphate solution and the mixture shaken. Normal fluids show not more than the faintest degree of opalescence. Globulin, if present, will produce a turbidity.

LANGE'S TEST.—A colloidal gold solution is prepared as follows. To 100 ml. of redistilled water, add 1 ml. of 1% neutral potassium oxalate solution and boil. Add immediately 1 ml. of 1% gold chloride solution and remove the flame. The resulting colloidal solution should be bright cherry red and show practically no fluorescence.

The test depends upon the fact that gold in colloidal suspension is precipitated by globulin, whereas albumin exhibits a protective action. In certain pathogenic conditions, such as general paralysis, the globulin content is high and the test is of value in the diagnosis of syphilitic meningitis, general paralysis and acute meningitis.

The test is carried out by setting up a series of eleven test tubes. In the first is placed 1.8 ml. of 0.4% sodium chloride solution and 0.2 ml. of cerebrospinal fluid. In each of the remaining ten tubes, 1 ml. of 0.4% sodium chloride is placed. 1 ml. of the mixture in tube No. 1 is transferred to tube No. 2 and 1 ml. from No. 2 to tube No. 3 and so on up to No. 10. In this way a series of increasing dilutions is prepared. Tube 1 is kept as a control. To each tube, 5 ml. of colloidal gold solution is added, and the tubes are set aside for 24 hours. At the end of this time the tubes are examined and the following designations used to indicate the results:—

- | | |
|---------------|------------------|
| 0 = no change | 3 = blue |
| 1 = red blue | 4 = bluish white |
| 2 = violet | 5 = colourless |

The results may be recorded graphically, and are characteristic for each pathogenic condition. The typical parietic curve obtained from a case of general paralysis is 5555431000, whilst that obtained in syphilitic meningitis (tabetic curve) is 01231000000 and that obtained in meningitis is 00013442100.

Each batch of colloidal gold solution must be tested for sensitivity against normal and known parietic fluids before carrying out the test.

EXAMINATION OF GASTRIC CONTENTS

Gastric contents may be in the form of a vomit or may be a sample withdrawn by a tube after a special test meal has been swallowed and allowed to remain in the stomach for a definite period. The chemical examination of a vomit except for the presence of blood or poisons is of little value.

Test meals are of two kinds:—

1. THE ONE-HOUR MEAL.—In this, a meal of 2 oz. of dry toast and 1 pint of tea (without milk and sugar) is given and allowed to remain for one hour. The stomach is then emptied by means of a stomach tube.

2. THE FRACTIONAL TEST MEAL.—The patient swallows a small catheter-like tube which has at the end a small metal bulb perforated in such a way that fluid can be drawn up by means of a syringe. After the tube has been swallowed the contents of the stomach, representative of what is present when the patient is fasting, are withdrawn. With the tube still in position a pint of thin oatmeal gruel is then swallowed. Samples of the gastric contents are withdrawn at half hourly intervals, the times of collection being noted. This is continued for 2-2½ hours.

The examination usually consists of noting any obvious constituents such as blood, bile, mucus or residues of food from previous meals.

In the case of the fractional test meal, the specimen containing no starch derived from the oatmeal usually indicates the hour at which the meal has completely passed from the stomach into the small intestine.

The sample of gastric contents is filtered and tested for the presence and amount of free hydrochloric acid, total acidity and sometimes total chlorides. A special test is usually made for the presence of lactic acid, but, as a rule, this is unnecessary if the specimen contains any appreciable amount of free hydrochloric acid. The determination of the enzyme pepsin is not a usual part of routine analysis and is only carried out when there is reason to believe that there is a deficiency of this enzyme.

The acid of the gastric juice is free hydrochloric acid and hydrochloric acid combined with protein. The latter still has a definitely acid reaction. A certain amount of hydrochloric acid is present in a neutralised form as sodium chloride. After the ingestion of a meal the acidity of the gastric contents rises for a time until gastric digestion is fairly complete and then with the emptying of the stomach tends to fall to the fasting level. In some diseases a prominent feature is complete absence of free hydrochloric acid at any time. In other cases there may be an excessive production of acid and these can be best recognised by the analysis of the specimens collected and described under a fractional test meal.

When hydrochloric acid is present as in a normal stomach, the growth

of bacteria and yeasts is prevented and, therefore, other acids are extremely unlikely to occur. In cases of deficient secretion of hydrochloric acid the presence of various organisms may cause fermentation of some of the food material with the production of organic acids such as lactic and butyric. The latter can usually be detected by its odour and the former is usually tested for by the colour test described below.

The actual concentration of acid in any particular sample of gastric juice varies considerably and the degree of response to a meal varies with the nature of the meal. For this reason simple standard meals such as the tea and toast and oatmeal gruel are used since the average normal response to them is known.

The gastric juice obtained from a fasting normal individual has the following approximate composition but the normal range is very wide:—

Volume—20–100 ml.

Free Hydrochloric Acid—about 0.11 per cent.

Total Acidity (as HCl)—0.18–0.24 per cent.

Lactic Acid—None

Bile Pigment—Present or Absent

Food Residue—None

Pepsin—Present

Total Chloride (as HCl)—about 0.36 per cent.

The presence of starch is detected by adding weak iodine solution in drops to any solid or semi-solid residue present in the sample. Bile is recognised by its golden or sometimes green colour.

Blood

Blood may be tested for by the Benzidine Test as follows:—

Boil a few ml. of the specimen in a test tube and, after cooling, neutralise to litmus paper with sodium hydroxide. In a clean tube place about 2 ml. of glacial acetic acid and add solid benzidine until the solution is obviously saturated. To this solution add a few drops of solution of hydrogen peroxide. After shaking for about one minute, add the neutralised gastric fluid. The presence of blood is shown by an intense blue colour brought about by the oxidation of the benzidine by the hydrogen peroxide and haemoglobin of the blood. It is an extremely sensitive test and dirty tubes or impure reagents may give false results. Any blue colour developing when the peroxide is added to the benzidine solution indicates that the glassware or reagents are not clean.

Lactic Acid

UFFELMANN'S TEST.—Half fill a test tube with 5 per cent. solution of phenol. To this add one or two drops of solution of ferric chloride and dilute with water until the test tube is nearly full. A few drops of the filtered gastric juice is added to this and the presence of lactic acid is shown by the development of a canary yellow colour. The test can only be properly carried out in daylight. The test solution must be used within a few minutes of its preparation.

Hydrochloric Acid

GUNZBERG'S TEST.—Mix 5 or 6 drops of 10 per cent. solution of phloroglucinol in alcohol with 5 or 6 drops of 10 per cent. vanillin in alcohol in a small evaporating basin. Add one or two drops of gastric

fluid and evaporate gently just to dryness on a water-bath. The presence of free hydrochloric acid is shown by the development of a bright red colour. The test is not specific for hydrochloric acid as other mineral acids will give it, but they are not met with in gastric juice.

THYMOL BLUE TEST.—A few drops of a solution of thymol blue will give a red colour when added to a few ml. of gastric juice if free hydrochloric acid is present. The organic acids and protein-combined hydrochloric acid, owing to their lower hydrogen-ion concentration, give only a yellow colour.

The quantity of free hydrochloric acid present may be determined with reasonable accuracy by titrating a measured volume of the gastric fluid with N/10 NaOH, using thymol blue as indicator. The reading of the NaOH from the red to the yellow is the reading for free hydrochloric acid, 1 ml. of N/10 NaOH being equivalent to 0.00365 g. of hydrochloric acid. With the same solution the titration may be carried on until the indicator becomes blue, when the solution is alkaline. The reading of the N/10 NaOH from the red to blue is a measure of the total acidity. As this may be due to a mixture of acids it is usually expressed in terms of hydrochloric acid.

TÖPFFER'S TEST.—One drop of 0.5% dimethylaminoazobenzene and one drop of 1% alcoholic phenolphthalein are added to 5 ml. of gastric juice. Free hydrochloric acid is determined by titrating against N/10 NaOH until the red colour changes to yellow and total acidity is determined by continuing the titration to a pink coloration.

EXAMINATION OF FÆCES

It is convenient to collect fæces in glass containers as this enables macroscopic examination of the specimen to be made. A note should be made of the colour, consistency and odour, which vary considerably with the diet. A diet consisting chiefly of milk and carbohydrates will yield yellow stools, whilst dark brown stools are produced when the diet is rich in meat. Green stools are due to the presence of biliverdin which has escaped conversion to stercobilin owing to rapid passage of the stools in cases of children suffering from diarrhoea. Both iron and bismuth compounds cause black stools which should be distinguished from the tarry stools that are due to the presence of altered blood when there is excessive bleeding.

Bilirubin

Bilirubin is not normally present in adult stools, but is generally present in an unaltered condition in the stools of very young infants. It may be oxidised to biliverdin on standing in air, thus producing green stools.

Qualitative Test. To a smear of fæces on a white tile, add two drops of fuming nitric acid. In the presence of bilirubin, a blue or green colour is produced. If 2 drops of Fouchet's reagent are used, in place of fuming nitric acid, the test is more sensitive and a green or greenish-blue colour is produced.

Blood

Unaltered blood on the surface of the stools usually indicates bleeding at the anus. Red blood cells may be identified by microscopical examination. In testing for occult blood in fæces, superficial bleeding

from the anus should be excluded and the patient should have been on a meat-free and green-vegetable-free diet for at least three days.

BENZIDINE TEST.—Mix a small fragment of faeces with 5 ml. of water in a test-tube and boil on a water-bath for 5 minutes. Cool, and add the liquid to a mixture of 5 ml. of saturated solution of benzidine in glacial acetic acid and 10 drops of 10 vol. hydrogen peroxide. The presence of blood is indicated by the development of a blue colour when the mixture is shaken. A faint reaction should be ignored as the test is extremely sensitive.

AMIDOPYRINE TEST.—To 5 ml. of boiled and cooled emulsion of the faeces in water add 3 to 4 drops of acetic acid and then layer 2 ml. of 5% amidopyrine solution in alcohol on the surface of the liquid. Drop in 5 to 6 drops of 10 vol. hydrogen peroxide. The presence of blood is indicated by a mauve colour which spreads up into the amidopyrine layer. By a combination of the benzidine and amidopyrine tests an estimate of the size of the hæmorrhage can be made. The benzidine test is more sensitive than the amidopyrine test so that, if positive reactions are obtained in both cases, the hæmorrhage is greater than if the benzidine test is positive and the amidopyrine test negative.

Fat

Fat in faeces is present in the form of neutral fat, free fatty acids and soaps. Care should be taken not to confuse liquid paraffin with undigested fat. Neutral fat is normally present to the extent of from 6 to 7% whilst the content of free fatty acids ranges from 7 to 8% and that of fat as soaps from 8 to 10%.

Determination of Neutral Fat and Free Fatty Acid. Extract 1 g. of dried faeces in a Soxhlet apparatus with ether. Evaporate the ethereal extract to remove the ether, dry the residue and weigh.

The free fatty acid may be determined by dissolving the residue in a little ether, diluting with alcohol, and titrating with N/10 alcoholic KOH, phenolphthalein being used as indicator. Each ml. of N/10 KOH is taken as equivalent to 0.0268 g. of fatty acid. By subtracting the calculated weight of fatty acids from the weight of total ether-soluble constituents, the content of neutral fat is determined.

Determination of Fat as Soaps. Transfer the residue from the first ether extraction to a porcelain dish and add 10 ml. of 10% concentrated hydrochloric acid in alcohol. Evaporate on a water-bath to a volume of about 5 ml. and add sufficient plaster of paris to make a paste. Carefully dry on a water-bath and extract the resulting powder with ether in a Soxhlet apparatus. Evaporate the ethereal extract and dry and weigh the residue which represents the fat present as soaps.

Urobilin

Urobilin or stercobilin is the normal pigment present in stools. Its absence in faeces indicates that there is an obstruction to the passage of bile into the small intestine.

Qualitative Test. Make a thick emulsion of the stool with amyl alcohol and allow to stand for 12 hours. Decant the supernatant liquid and carry out Schlesinger's test described on page 273.

NOTES ON BACTERIOLOGY

Bacteria are unicellular micro-organisms of very simple structure, each organism consisting of a mass of protoplasm with a slightly more concentrated layer forming the envelope. No nucleus is present, but the protoplasm contains vacuoles, various granular bodies known as volutin granules and occasionally glycogen, starch and globules of fat. They contain no chlorophyll or similar pigment so that they cannot elaborate food material by photosynthesis.

Distribution and Habits. Bacteria are widely distributed in nature, being present in soil, water and air. Air-borne bacteria are associated with dust particles. They may live as *saprophytes* on dead material (as in the soil) or as *parasites* in a living host. In the latter case, the growing organisms may cause the death of the host by producing poisons (toxins), by decomposing the tissues or by disturbing the general metabolism. Such disease-producing organisms are termed *pathogenic* bacteria as distinct from the harmless or *non-pathogenic* types.

The toxins or poisons which some pathogenic bacteria produce pass into the medium and are termed *exotoxins*. When retained within the organisms they are called *endotoxins*.

Some bacteria can prepare food material from such simple substances as carbon dioxide, nitrogen, nitrates and ammonium compounds, but the highly parasitic types require previously elaborated products such as proteins and carbohydrates.

Oxygen. The presence of atmospheric oxygen is essential for the existence of certain bacteria which are termed *aerobes*. Others which will only grow in the absence of oxygen are termed *anaerobes*. The organisms causing tetanus and the gas-gangrene are examples of the latter class. Some bacteria, termed *facultative anaerobes*, grow equally well whether oxygen is present or not. Anaerobes require either special media or they can be grown on ordinary aerobic media if enclosed in a sealed vessel known as an "anaerobic jar", the atmosphere in which has been freed from oxygen.

Hydrogen Ion Concentration. Bacteria are very sensitive to changes in hydrogen ion concentration. The range for growth is about pH 4.0 to pH 9.0, the optimum pH for the majority of organisms being from 7.4 to 7.6. There are acid-producing organisms, such as the lactic acid bacillus, which can survive and multiply in more acid conditions, while other organisms, such as *Vibrio cholerae*, prefer more alkaline conditions. It is therefore very important to adjust most culture media to a pH of 7.4 to 7.6.

Effect of Heat. Bacteria can be subjected to very low temperatures and still remain viable; organisms have lived through exposure to the

temperature of evaporation of liquid hydrogen (-252°). The optimum temperature for growth for the majority of pathogenic bacteria is 35° to 40° , the thermal death-point varying according to the presence or absence of water, being much lower when water is present. Ordinary vegetative organisms are killed on exposure to a temperature of 60° for 1 hour, when dry, or of 80° for 10 minutes in the presence of water. Spores are more resistant to heat than ordinary vegetative bacteria. They require to kill them a temperature of 150° for 1 hour when dry and of 115° for 30 minutes in the presence of moisture.

Reproduction. The manner of reproduction of bacteria is by simple fission, one organism dividing into two. Division may occur every 20 to 30 minutes and in favourable circumstances the organisms multiply very rapidly.

Spores. Under unfavourable conditions, such as the absence of food and water, some bacteria form spores which possess envelopes which are highly resistant to heat. Spores must be considered the resting-stage of bacteria and they can thus live through conditions which might kill the ordinary vegetative forms. Certain highly pathogenic bacteria such as those causing tetanus, anthrax and gas-gangrene readily form spores.

Capsules. Some bacteria may secrete around their envelope a layer of mucilaginous material known as a capsule. Occasionally, this capsule is pathogenically very important. Thus, the pneumococcus may or may not develop a capsule according to the conditions operating, but if no capsule is present the organism is non-pathogenic whilst the capsulated organism may be highly pathogenic.

Motility. Some bacteria have the power of moving freely in water. This is generally due to the presence of whip-like appendages known as *flagella*. The typhoid bacillus is a good example of this class of motile bacteria.

Sizes and Shapes. Bacteria may be globular in shape or they may occur as straight, curved or spiral rods, or as branching filaments. The largest size of the globular bacteria (cocci) is about 1μ ($\frac{1}{25000}$ inch). The rods are generally about 5μ in length, but some of the spiral rods (spirella and spirochaetes) may be much longer. In any case, they are too small to be distinguished as separate organisms by the naked eye. When growing in a mass on the surface of solid material they form characteristic colonies which differ in appearance according to the particular organism constituting them.

CLASSIFICATION

Bacteria belong to the *Schizomycetes* or splitting fungi and are subdivided into orders, families and geni. Like plants and animals it is usual to give a bacterium both a generic and a specific name, such as *Staphylococcus aureus*, *Clostridium tetani*, etc. A genus includes organisms which closely resemble each other in many characters, such as shape, mode of life, etc.

The following are common examples:—

Genus	Characters of genus	Representative organism. General and specific names
Staphylococcus	globular, gram + , associated in groups	<i>Staphylococcus aureus</i>
Streptococcus	globular, gram + , associated in chains	<i>Streptococcus pyogenes</i>
Neisseria	globular, gram — , associated in pairs	<i>Neisseria gonorrhææ</i>
Bacterium	rods, gram — , non-sporing	<i>Bacterium coli</i>
Bacillus	rods, gram + , sporing, ærobic	<i>Bacillus subtilis</i>
Clostridium	rods, gram + , sporing, anærobic	<i>Clostridium tetani</i>

The following are well-known pathogenic organisms and the diseases they produce:—

Organism	Disease
<i>Corynebacterium diphtheria</i>	Diphtheria
<i>Mycobacterium tuberculosis</i>	Tuberculosis
<i>Streptococcus pneumonia</i>	Lobar pneumonia
<i>Streptococcus pyogenes</i>	Scarlet fever, septicæmia
<i>Staphylococcus aureus</i>	Suppuration, boils, etc.
<i>Clostridium tetani</i>	Tetanus
<i>Clostridium welchii</i>	Gas-gangrene
<i>Bacillus anthracis</i>	Anthrax
<i>Bacterium coli</i>	Cystitis
<i>Bacterium typhosum</i>	Typhoid fever
<i>Neisseria meningitidis</i>	Cerebrospinal meningitis
<i>Brucella melitensis</i>	Malta fever
„ <i>abortus</i>	Undulant fever
<i>Trypanosoma pallida</i>	Syphilis

Identification. Bacteria are identified by the following characteristics:—

- (1) their morphology as seen under the microscope, *i.e.*, shape, size, etc.;
- (2) the macroscopical appearance of their colonies and their development in various culture media;
- (3) their biochemical reactions when they are grown in media containing various sugars;
- (4) their effect upon animals after injection or inoculation.

CULTURE MEDIA

The following media are in general use for growing bacteria:—

Nutrient Broth for general use in growing aerobes or for testing for sterility may be made by the following methods:—

(a) **Beef Broth (Bouillon)**

Minced lean beef	500.0
Tap water	1000.0
Peptone	0.1
Sodium Chloride	0.05

Add the water to the finely minced beef and allow to simmer for about 2 hours. Cool, skim off any fat from the surface. Strain through muslin, press the residue (which is saved for Cooked Meat Media), mix the two solutions, filter, dissolve the peptone and sodium chloride in the solution, make slightly alkaline with a solution of sodium hydroxide boil for 15 minutes, filter from precipitated phosphates, add hydrochloric acid until the solution has a pH 7.4 to 7.6, place in final containers, seal, and sterilise by autoclaving.

(b) **Meat Extract Broth**

Lab Lemco	10
Peptone	10
Sodium Chloride	5
Tap Water	1000

Dissolve the constituents in the water, make slightly alkaline with sodium hydroxide and then proceed as for Beef Broth.

(c) **Digest Broth or Hartley's Broth.** This is broth prepared by digesting beef with trypsin when peptone is produced. Properly prepared, this broth is the best medium for obtaining good growth.

Nutrient Agar Medium. This is a solid medium for use as "slopes" in test tubes or as "agar plates" in petri dishes. It is prepared by dissolving 2% of agar in any of the forms of Nutrient Broth. It is used for growing surface colonies of aerobes or, in an anaerobic jar, for surface colonies of anaerobes. Sometimes 2% of dextrose is added.

Anaerobic Culture Media. The following are in general use for growing anaerobes or for testing for sterility:—

(a) **Cooked Meat Medium.** Squeeze the meat residue from Beef Broth as dry as possible. Introduce enough into test tubes so as to give a layer about 1 cm. deep. Add Nutrient Broth so that there is about two inches of clear liquid above the meat. Plug the tubes with non-absorbent cotton wool and sterilise by autoclaving. Before use, the tubes should be boiled for a few minutes to get rid of oxygen and then cooled.

(b) **"Sloppy" Agar Medium**

Agar in powder	0.4
Dextrose	1.0
Nutrient Broth	100.0

Dissolve. Sterilise by autoclaving.

(c) **Thioglycollate Medium.** This is Nutrient Broth containing 0.1% of sodium thioglycollate and 0.2% of agar. Anaerobes grow freely in this medium.

Some bacteria (generally parasitic ones) do not grow readily on the foregoing media, but require special constituents in addition, such as serum, blood, egg, milk, glycerin or potato juice.

Selective Media. These media contain special constituents, added to ordinary media which permit the growth of certain organisms and repress the growth of others.

The following are in common use:—

(a) **Tellurite Medium.** This is Nutrient Agar Medium containing potassium or copper tellurite. It permits the growth of *Corynebacterium diphtheriae*, but represses the growth of many other organisms.

(b) **Methyl Violet Medium.** This permits the growth of gram-negative organisms, but represses the growth of gram-positive ones.

(c) **MacConkey's Medium.** This is Nutrient Agar Medium containing lactose, sodium taurocholate and neutral red. It permits the growth only of intestinal organisms such as those of the typhoid, paratyphoid, dysentery and *B. coli* groups. Some of these, while growing, ferment the lactose producing acid which turns the medium from yellow to red. This medium is therefore both selective and diagnostic. It is a very valuable medium for use in the bacteriological examination of drinking water.

Identification Media. These are media containing special constituents, usually sugars, which may be acted upon by the growing bacteria with the production of products such as acids or gases. These media contain an indicator such as neutral red which changes in colour if acid is produced. Any gas which may be evolved is trapped in a small inverted test tube placed in the medium. The resulting biochemical reactions help to identify the organism. The sugars usually employed are dextrose, maltose, lactose and sucrose, also the substances mannitol and salicin. The media are prepared according to the following formula:

Peptone Sugar Medium

Peptone	..	..	..	2.0
Sodium Chloride	..	..	..	0.5
The special sugar or substance	..	..	..	0.5
Neutral Red	..	..	..	0.005
Water	..	..	to	100.0

The following results, using organisms of the genus *Bacterium*, show the value of the method:—

Organism	Dextrose	Maltose	Mannitol	Lactose	Sucrose
<i>B. aerogenes</i>	A.G.	A.G.	A.G.	A.G.	A.G.
<i>B. coli</i>	A.G.	A.G.	A.G.	A.G.	—
<i>B. paratyphoid</i>	A.G.	A.G.	A.G.	—	—
<i>B. typhi suis</i>	A.G.	A.G.	—	—	—
<i>B. morgani</i>	A.G.	—	—	—	—
<i>B. alkigenes</i>	—	—	—	—	—
<i>B. typhosum</i>	A	A	A	A	—
<i>B. dysenteriae</i>	A	—	—	—	—

A = Acid produced

G = Gas produced

STAINS AND STAINING

Bacteria can often be identified by their reactions towards certain stains which usually consist of solutions of aniline dyes. The most important one is known as Gram's stain which can be used to divide all bacteria into two classes, those which retain the stain and those which do not. The former are known as gram-positive organisms and the latter as gram-negative. This is the first identification staining reaction which should be performed and should be followed by special staining methods which will give further information. There are special stains which are used for the detection of spores, volutin granules, capsules and flagella. An important class of bacteria are termed *acid fast* because, if stained with carbol fuchsin, they retain the stain when immersed in hydrochloric acid. Some stains, such as Loeffler's Methylene Blue or Safranin are general stains, the colour being taken by all organisms. These are often used in conjunction with special stains when they are known as counterstains.

The general method of using stains is as follows:—Hold the tube of the culture in the left hand, between thumb and forefinger, in a sloping position. Take a platinum wire, terminating in a loop and fixed in a glass rod, in the right hand. Sterilise the wire in a bunsen flame, allow to cool, remove the plug of the culture tube with the little finger of the right hand, insert the sterile platinum wire and remove a very minute portion of the growth. Close the culture tube with the plug and mix the growth with a loopful of sterile water on a slide, spreading it out to form a film. Dry the film carefully over the flame and then pass it twice rapidly through the flame. This fixes the film on the slide. Flood the slide with the stain and leave it in contact for a half to one minute. Pour off the stain and wash for a few seconds in water; blot off excess of water with white filter paper and dry again carefully over the flame. The slide is then ready for examination, first under the low power and then with an oil immersion ($\frac{1}{2}$ in.) lens. Details of technique will vary slightly with different stains.

Composition of Stains

Gram's Stain

This consists of two solutions:—

A. Methyl Violet	..	..	..	2
Aniline	..	..	..	3
Water	..	..	to	100
B. Iodine	..	..	..	1
Potassium Iodide	..	..	..	2
Water	..	..	to	300

This solution is often used stronger.

Flood the slide with A for 30 seconds, pour off, flood with B for 60 seconds, pour off, and then carefully wash the film with alcohol until the colour ceases to come out. Counterstain with Safranin.

Safranin

Safranin	..	..	..	..	0.5
Water	..	..	..	..	1000.0

Loeffler's Methylene Blue

Saturated Alcoholic Solution of	
Methylene Blue	33
Solution of Potassium Hydroxide	
1 in 10,000	100

Carbol-Fuchsin (Ziehl Neelsen)

Basic Fuchsin	1
Phenol	5
Alcohol	10
Water	100

This is used for staining the tubercle bacillus and spores.

Staining of Spores

1. Prepare a film on a cover slide, pour over this the filtered carbol-fuchsin solution and warm gently over a Bunsen flame.
2. Decolorise with 1% sulphuric acid in water or methylated spirit.
3. Wash with water.
4. Counterstain with methylene blue for half a minute.
5. Wash and dry.

Staining of Tubercle Bacilli

1. Prepare the film, dry and fix in flame.
2. Heat the specimen, in a dish, covered with carbol-fuchsin solution, until steam arises (or keep cold for twenty-four hours).
3. Decolorise with 20% solution of strong sulphuric, nitric or hydrochloric acid.
4. Wash well with water, then with alcohol, and again with water.
5. Counterstain with methylene blue, wash and dry.

Neisser's Stain A two-solution stain for diphtheria organisms.

A. Methylene Blue	0.1
Alcohol	2.0
Glacial Acetic Acid	5.0
Water	95.0
B. Bismark Brown	0.2
Water	100.0

Capsule Stain (Muir's Method). Flood the film with carbol-fuchsin, heat gently for 30 seconds, wash with alcohol for one second only and immediately wash under the tap. Flood with Muir's Mordant for 30 seconds, wash well with water, flood with alcohol until pale pink (about 60 seconds), wash well with water. Counterstain with Loeffler's Methylene Blue.

Muir's Mordant

Solution of Tannic Acid 20%	2
Saturated Solution of Mercuric Chloride	2
Saturated Solution of Potash Alum	5
Water	to 100

VIRUSES

Certain diseases, such as measles, smallpox, rabies, foot-and-mouth disease, epidemic poliomyelitis and certain plant diseases are caused by very minute organisms which can pass through a filter capable of stopping ordinary bacteria. These are often termed "filterable viruses", although this property of filter-passing may vary with the filter. They differ from ordinary bacteria in that:—

- (a) they are always parasitic and can only multiply in the presence of living cells, either animal or vegetable; they live inside the cells of the host;
- (b) they are very small, generally too small to be photographed; the virus of foot-and-mouth disease is calculated to be of a diameter of 10 m μ ;
- (c) they are generally very resistant to glycerin;
- (d) they generally confer a long immunity on the host after an attack.

Recent work has indicated the possibility that some viruses are chemical substances of the nature of proteins with a very high molecular weight.

The B.P. contains *Vaccinum Vacciniae*, or calf lymph, a preparation of the virus of cowpox which is an attenuated form of the virus of smallpox. The cowpox virus has the property of conferring immunity against smallpox.

Pathogenic Fungi

Fungi are very rarely pathogenic, but *Microspora* and *Trichophyta* produce various forms of ringworm, *Achoria* produces favus and *Oidium albicans* produces thrush in children.

Protozoa

Certain diseases such as malaria, amoebic dysentery and kala-azar are caused by protozoa which belong to the lowest group of the animal kingdom comprising organisms which consist of single cells or colonies of cells and possessing no nervous or circulatory system.

IMMUNOLOGY

When certain substances such as proteins are injected parenterally into an animal they cause the formation of *antibodies* in the blood of that animal. The name *antigen* is given to a substance which is capable of promoting the formation of an antibody. If the serum is obtained from the blood of an animal after injection of an antigen and mixed in a test tube with some of the antigen and a little saline, a precipitate will gradually form. This reaction is highly specific, for the precipitate only forms if the antigen is of the same composition as that which was injected. A suspension of dead bacteria, when injected, functions antigenically and when the resulting serum is mixed with a suspension of the same organisms the latter are caused to agglutinate or clump. Exotoxins also act as antigens and the resulting antibodies are termed *Antitoxins*. An antitoxin will combine with its corresponding toxin and render it harmless. A person who has received an injection of dead bacteria or of a bacterial toxin thus develops a defence mechanism and is said to have become *immunised* against that particular organism or the disease which

it may cause. Immunity which is developed by deliberate introduction into the body of bacteria or of their products is known as *artificial active immunity* and is practised in the various forms of prophylactic inoculation.

Vaccines. Vaccines are suspensions of dead bacteria for use as antigens. Living bacteria are rarely injected because of the danger that they might multiply in the body. Anti-typhoid-paratyphoid Vaccine or T.A.B. Vaccine is official in the *B.P.*, and consists of a suspension of dead organisms of typhoid and paratyphoid A and B.

Toxins are also used in prophylactic treatment, but are rather dangerous because of their toxicity. By treatment with formaldehyde, however, they are converted into *toxoids* which, though non-toxic, still retain the power of promoting the formation of antitoxins. Diphtheria Prophylactic is of this type and is official in the *B.P.*

Antisera. The serum of an animal which has received an injection of dead bacteria or of toxin or toxoid contains the specific antibodies to these substances. When bacteria are used as antigens, the antiserum produced is known as an *antibacterial serum* and when toxin or toxoid is used, the antiserum is termed an *antitoxic serum*. The following are official in the *B.P.*

Antibacterial Sera

Antidysentery Serum (Shiga).

Antipneumococcus Serum Types I and II.

Antitoxic Sera

Diphtheria Antitoxin.

Gas-gangrene Antitoxin (Edematiens).

Gas-gangrene Antitoxin (vibrio-septique).

Gas-gangrene Antitoxin (perfringens).

Staphylococcus Antitoxin.

Tetanus Antitoxin.

The preparations are used therapeutically, *i.e.*, for injection into persons who are already infected with the disease. This is *passive immunity* which provides the requisite concentration of antibody to combat the disease, but the protection which it affords only lasts for a short time.

Diagnostic Bacterial Products. When toxins (but not toxoids) are injected into the skin of a person possessing little or no antitoxin, an area of redness develops around the site of the injection. The presence of a sufficiency of antitoxin prevents this phenomenon. Thus toxins can be used as diagnostic agents to find out if a person possesses sufficient antitoxin to create an immunity against an attack of the disease.

The following diagnostic preparations are official in the *B.P.*:—

Schick Test Toxin is a preparation of the toxin excreted by *Corynebacterium diphtherie* and is used to detect immunity against diphtheria.

Schick Test Control is Schick Test Toxin which has been heated so as to destroy the toxin. It is always injected alongside that of the Test Toxin in order to find out if the skin reaction is really due to the

toxin and is not a pseudo-reaction caused by constituents other than the toxin.

Old Tuberculin is another diagnostic preparation. When it is injected *into* the skin of persons infected with the tubercle organism, either in the latent or active form, an area of redness develops. Old Tuberculin does not act as an antigen and cannot therefore be used for producing immunity against tuberculosis.

ANTISEPTICS AND DISINFECTANTS

Antiseptics are substances which will *prevent* the growth of micro-organisms. When used against bacteria they are called *bacteriostatics* and when against fungi, *fungistatics*.

Disinfectants are substances which kill micro-organisms and the corresponding terms are *bactericides* and *fungicides*. When used against viruses, they are called *viricides*. The term *germicide* is sometimes used to indicate activity against all micro-organisms. Many disinfectants when used in weak concentrations function as antiseptics.

Antiseptics may be incorporated in the following:—

(a) PARENTERAL INJECTIONS. These preparations must be sterile and, if several doses are included in one container, sterility must be maintained. The presence of an antiseptic prevents the growth of any micro-organisms which may accidentally infect the preparation. Antiseptics used must be non-toxic. The following may be used for this purpose: phenol 0.5%, chlorbutol 0.5%, cresol 0.3%, chlorocresol 0.1%, phenyl mercuric nitrate 0.001%.

(b) AQUEOUS PREPARATIONS, such as eye drops, eye lotions, creams, pastes, emulsions, etc., are liable to promote the growth of bacteria and fungi. The latter may appear as unsightly, ropy growths or surface colonies. They are rarely dangerous, but they may cause decomposition of the preparations. The antiseptics or preservatives used for these preparations are chlorocresol, chloroform, benzoic acid, sodium benzoate, thymol and certain esters of *p*-hydroxybenzoic acid.

(c) FOODS. Certain antiseptics or preservatives are permitted in food and many are forbidden by the Food and Drugs Act. Strict control of the presence of preservatives in foods is necessary because of the risk of either poisoning or interference with digestion.

(d) WOUNDS. The application of an antiseptic to a wound is intended to *prevent* the development of any bacteria which may be present and thus give time for their destruction by the leucocytes in the blood. The following are some of the substances used as wound antiseptics:—acriflavine, proflavine, Dakin's solution, penicillin, solution of chloroxylenol and sulphanimide.

Surgical Instruments. Lysol either undiluted or in 1 in 10 solution is usually used for sterilising surgical instruments.

Skin. It is necessary to sterilise the skin prior to a surgical operation on the hands in midwifery practice. Iodine 2% in potassium iodide solution or a solution of such dyes as methyl violet or brilliant green is used for skin sterilisation. Solution of chloroxylenol, undiluted, is used for both skin and hands.

FOOD AND DIET

Food provides materials for building or repairing the body and (still more important) the energy needed by all living organisms. Even in babies much more food is needed to keep them alive and healthy than to make them grow. The accompanying table shows that in human milk just after the baby has been born the body-building substances, protein and mineral salts, form less than a quarter of the total solids. This proportion is reduced to less than an eighth as weaning approaches. In cow's milk the proportion is higher because calves grow more rapidly than babies do. Hence any attempt to make cow's milk suitable for babies must involve reduction in its protein and mineral content. This may be done by diluting cow's milk with water and adding sugar of milk and cream or milk fat to increase the content of carbohydrate and fat, the two great classes of energy providers. (The "humanised milk" thus obtained still differs from human milk both in digestibility and in nature and content of proteins.)

**Percentage Composition of Human Milk at Different Stages of Lactation
Compared with that of Average Cow's Milk**

	Human Milk					Cow's Milk Average
	Weeks of Lactation					
	1	2	3-9	10-17	20-40	
Protein	2.0	1.6	1.1	1.0	0.8	3.3
Fat	2.8	3.1	3.8	2.9	2.6	3.0
Lactose	5.4	6.2	6.4	6.7	6.8	4.7
Ash	0.34	0.27	0.22	0.20	0.19	0.7

Energy Values and Requirements. These are measured in Calories (spelt with a capital "C" to distinguish them from calories). A Calorie is the amount of energy required to heat 1 kilogram of water through one degree Centigrade, and thus has a thousand times the value of a calorie. In foods, fat forms the most concentrated source of energy, 1 gramme providing 9.3 Calories. For carbohydrates and proteins the approximate factor is 4.1 Calories. Thus if we know the proportion of carbohydrate, fat and protein in a food we can use the above factors to calculate its energy value. From the above table we can see that 100 ml. (approx. 3½ fl. oz.) of a fairly good sample of cow's milk will provide about 60 Calories, i.e.:

Lactose	$4.7 \times 4.1 = 19.3$	Calories
Protein	$3.3 \times 4.1 = 13.5$	"
Fat	$3.0 \times 9.3 = 27.9$	"
Total	.. .. 60.7	"

Similarly it can be calculated that human milk just after birth will provide about 58 Calories per 100 ml. Now babies require about 100 Calories daily for each kilogram body-weight. Hence a baby weighing 6½ lb. (approx. 3 kg.) would require about 300 Calories daily, and could obtain this from about 500 ml. of its mother's milk. As children grow

older their energy requirements per kg. become less. The requirement for an adult is 30 to 60 Calories per kg. depending mainly on the amount of work done. A man weighing 11 stones (approx. 70 kg.) would thus need 2100 to 4000 Calories daily. Of this at least 1500 Calories would be needed to keep him going, the remainder being available for his everyday work. An unemployed man living on a diet providing only 2100 Calories daily would thus be able to do work equivalent to about 600 Calories, whereas a man receiving 4000 Calories daily (*i.e.*, about twice as much food) could do four times as much work (equivalent to about 2500 Calories).

Calculation of Food Values. Food values must be based on human requirements and energy values. For instance, the protein requirement of a man living on a diet providing 3000 Calories daily is usually considered to be about 100 grammes a day, of which 50 grammes should come from animal sources. Therefore *on the average* each 60 Calories of the diet should represent 2 grammes of protein or 1 gramme of animal protein. Now 100 ml. of cow's milk yielding about 60 Calories provide 3.3 grammes of animal protein. As a source of protein cow's milk therefore has $\frac{3.3}{2}$ or 1.65 times the average protein value of the diet.

As a source of animal protein its value is 3.3 times the average.

Biological Value of Proteins. The protein of milk and cheese contains all the amino-acids essential for body-building and therefore has the highest biological value. The protein of eggs and of meat is of almost as high value as that of milk and cheese. Proteins obtained from the plant kingdom may provide a less complete selection of essential amino-acids and therefore have a lower biological value, since more has to be eaten to satisfy requirements. The deficiencies of plant proteins may be made good by eating a mixed diet containing both cereal proteins and the proteins of green vegetables, including pulses (beans, peas and lentils).

Essential Minerals

There are at least 10 mineral elements of which supplies are essential for human life and well-being. Some of these are needed in fairly large amounts (*e.g.*, from $\frac{1}{2}$ to 10 grammes daily). Others are needed only in traces (less than a twentieth of a gramme daily). The first group includes sodium, potassium, calcium, phosphorus and magnesium, to which may be added the non-mineral elements of sulphur and chlorine. The "trace elements" include iron, copper, silica, fluorine, iodine, and manganese. *Sodium* and *chlorine* are constant constituents of the body fluids such as the blood, and if the concentration of either falls below a certain minimum the results may be serious. Coal miners working for hours in a hot, dry atmosphere may lose so much sodium chloride in their profuse perspiration that severe cramp develops, and is cured by putting salt in their drinks. *Potassium* is required for formation of muscles and red blood cells. *Sulphur* is present mainly in organic compounds, especially proteins. *Magnesium* occurs in the bones and teeth, and also modifies the stimulation of muscles and nerves by calcium. There is no proof that ordinary diets are deficient in any of the above elements. *Calcium* and *phosphorus*

may be considered together. Since they are needed for bone formation, their requirements are greater in children and pregnant women, ranging from 1 to 1.5 g. daily as compared with 1 g. in adults. Rickets and other diseases due to malformation of bones have frequently been observed when the diet has been deficient in calcium and phosphorus and supplies of vitamin D have been inadequate. Pre-war deficiencies of calcium and phosphorus in the diet of many children have been made good by the milk which has been allocated to them. Babies can assimilate calcium more efficiently from human milk than from cow's milk. Human milk contains twice as much calcium as phosphorus, a ratio more favourable for the assimilation of the calcium than the corresponding ratio of about 4:3 in cow's milk. *Iron* is needed mainly for formation of hæmoglobin, the pigment in red blood cells which gives blood its colour and performs the vital function of carrying the oxygen on which life depends. Milk is not a good source of iron. Babies living on milk only can obtain extra iron from the reserves stored in their livers. Older children can obtain iron from wholemeal bread, oatmeal, eggs, potatoes and green vegetables such as spinach. Meat is not a good source of iron, because only a small proportion of the iron in the hæmoglobin can be assimilated. Iron deficiency leading to anæmia occurs more frequently in women because of child-bearing and of the loss of blood in menstruation. The daily requirement of iron ranges from 6 mg. in infants to 15 mg. in adults. *Copper* is associated with iron in hæmoglobin formation and other functions. Up to the present no definite evidence has been obtained of copper deficiency in man. It is possible that the efficiency of some medicinal preparations of iron has been reduced by the employment of more stringent purification which removes traces of copper present in earlier and cruder preparations. *Iodine* is of particular interest. The human requirement is very small, only about 0.1 mg. daily, yet in certain parts of the world the foodstuffs such as dairy produce and vegetables, which serve as the main source of iodine, may not supply this minute amount, and ill effects may ensue. The iodine is needed for the formation of the hormone thyroxine, which stimulates physical and mental activities. Thus deficiency of iodine in the diet may affect the capacity for physical and mental work, and if long continued may lead to serious disease. In Switzerland and America this has been prevented by adding potassium iodide to table salt.

Fluorine is present in the bones and teeth and the view that it is an essential element in nutrition, associated especially with the formation of the enamel of teeth, has been generally held; attempts to demonstrate an impairment of growth or health from the use of diets containing minimal amounts of fluorine have, however, entirely failed. On the other hand, "mottled teeth" due to an excessive intake of fluorine show an increased immunity to dental caries. *Manganese* appears to be associated with iron in its physiological functions. It is stated to increase the body's resistance against infection by staphylococci, but definite proof of this is lacking. *Silica* is also present in the teeth and bones. Deficiency in man appears to be rare.

Vitamins

Vitamins and essential minerals are especially important because a shortage of them in the diet will gradually lead to diseases with

characteristic symptoms which become more pronounced as the shortage becomes greater and gradually disappear when the shortage is made good. Vitamins, like the trace elements, are on the whole needed only in very small amounts, the daily human requirement usually being only a few milligrammes. But whereas the trace elements provide inorganic elements giving activity to a large molecule, such as the iron in hæmoglobin, the vitamins are organic compounds supplying active groups in hormones, respiratory enzymes and other substances controlling the activities of the body. In young animals, including man, vitamin deficiency retards the rate of growth. For instance, if young rats are fed on a diet practically free from vitamin A until growth has almost ceased and are then supplied with different doses of a food being tested for this vitamin, the rate of growth will (within certain limits) increase as the dose of vitamin A is made higher, thus providing the basis for a biological assay. Other assays are based on the characteristic symptoms of a deficiency of the particular vitamin, such as the effects on the structure of the bones or teeth. Whilst our knowledge of vitamins is based originally on the results of biological experiments, the rapid spread of this knowledge in recent years has been due to the introduction of chemical methods of testing for vitamins, especially those methods which could be applied to blood and urine and thus enable large scale investigations to be carried out on human beings. Sometimes the test used is not for the vitamin itself but for a substance associated with its physiological functions. For instance, in children suffering from deficiency of vitamin D the amount of phosphatase enzyme in the blood increases considerably and this increase can be used to measure the effect of treating this disease by administration of the vitamin.

Body Reserves of Vitamins. Vitamins A, D and E which are soluble in fats, are stored in the liver and fatty tissues. The amounts stored vary considerably but are mainly dependent on the diet and may provide sufficient reserves to meet several months demands. Vitamins A and D, for instance, are stored in the body during the summer to provide reserves to carry us over the winter, when our diet tends to contain much less of these vitamins. Vitamin C, the vitamins of the B group, and probably other vitamins, which are soluble in water are stored in relatively much smaller amounts. If a person with depleted body reserves of one of these water-soluble vitamins is given daily a dose representing several times the daily requirement of that vitamin most of it will be retained in the body until the body reserves have been built up, after which the greater part of each dose will be excreted in the urine. Thus, by testing the urine daily until there is a sudden marked increase in its content of the particular vitamin we can find how much of the vitamin had to be given to saturate the body reserves, and thus obtain a measure of the degree of deficiency. Such urine saturation tests have been widely employed in nutritional surveys to discover whether the diet has been supplying sufficient of a given vitamin.

Vitamin A. This is formed in the animal body from carotene and certain other pigments originating in plants. Carotene is present in all green leaves, in carrots and tomatoes, and in many red fruits. It is usually accompanied by other yellow pigments which are not converted into vitamin A in the animal body. Thus, in order to determine by

chemical means the vitamin A value of a foodstuff containing carotene we must separate the latter from other pigments by means of solvents and suitable adsorbents and determine the carotene in the solution by colorimetric or, preferably, spectroscopic methods. In dairy produce (e.g., milk, butter and eggs) some of the carotene has been converted into vitamin A, which is determined chemically by other methods. These latter are applied to liver oils and fats, the richest natural sources of pre-formed vitamin A. The vitamin can be determined by measuring its characteristic absorption in the ultra-violet region at 328 m μ , or by measuring the intensity of the transient blue colour produced by antimony trichloride in chloroform. The antimony trichloride test has been widely employed to determine the vitamin A value of liver oils, being introduced into the 1932 edition of the British Pharmacopœia to secure a minimum value for cod-liver oil. It is, however, given by other substances beside vitamin A. Some, but not all, of these can be removed by saponifying the oil by mild treatment with alkali and applying the test to the unsaponifiable fraction. The ultra-violet absorption at 328 m μ is also made more specific for vitamin A when it is applied to the unsaponifiable fraction.

Studies on vitamin A requirements in man have been greatly helped by the so-called dark adaptation test. This depends on the rate of adaptation of the eyes to darkness. In the presence of vitamin A deficiency the time taken for this is considerably lengthened, becoming less as the deficiency is gradually made good by administration of the vitamin. By this means, evidence has been obtained that a man's daily requirement is about 5000 international units of vitamin A or 3 mg. of β -carotene. The vitamin A requirements of children appear to be as high as those of adults, and since young children eat much less food than adults this food should be richer in vitamin A or carotene.

Vitamin B Group This includes at least six, and possibly more, different vitamins, all of which appear to be closely related to metabolic processes in the body. Broadly speaking, the more work we do, the more of the B vitamins we require.

Vitamin B₁, or aneurine hydrochloride (known in U.S.A. as thiamine hydrochloride), is concerned with the breakdown of carbohydrates to yield energy in the animal body. Even micro-organisms such as bacteria or yeast cells need vitamin B₁ for their growth and activities, but, after an initial start, are able to synthesise it from suitable raw materials. Thus, cows and other ruminants obtain a considerable proportion of their vitamin B₁ requirement from the bacteria in their intestines. Yeast forms one of the best sources of all the B vitamins; $\frac{1}{4}$ to 1 oz. of an average yeast should supply the daily adult requirement (about 500 i.u. or 1.5 mg.) of vitamin B₁. It is possible to obtain yeast specially rich in vitamin B₁ so that the daily requirement is provided by as little as 2 grammes. Cereals are good sources of the B vitamins, which are concentrated in the embryo. Wheat germ has been recommended as the richest natural source of vitamin B₁, but recent research has shown that this vitamin is much more concentrated in the scutellum.

Vitamin B₁ can be estimated *biologically* by its effect in promoting growth, curing or preventing polyneuritis or bradycardia in animals living on diets deficient in this factor. It can be estimated *microbiologically*

by its effect on the growth of yeast (or certain other micro-organisms) living in media free from compounds from which the yeast can synthesise the vitamin. It can be estimated *chemically* by a colour test given by diazotised *p*-aminoacetophenone. The chemical test most widely used is based on the thiochrome reaction. When aneurine is treated with alkaline potassium ferricyanide under suitable conditions it is converted into the compound thiochrome, characterised by a bluish fluorescence in ultra-violet light. The intensity of the fluorescence is compared with that of a suitable standard either visually or in a fluorimeter in which a photo-electric cell replaces the human eye. The photo-electric method is the most accurate but needs very careful control, since the intensity of the fluorescence is affected by a number of factors, including the presence of impurities which may be very difficult to remove. A *polarographic method* of estimating vitamin B₁ by changes in the current voltage curve obtained with the dropping mercury electrode has been used by certain workers in America and is under examination here.

Severe deficiency of vitamin B₁ leads to polyneuritis, a disease of the nervous system. Originally vitamin B was the name given to a supposed single vitamin possessing a number of properties, including cure of polyneuritis and of pellagra. When it was found that the anti-neuritic property was destroyed by heating under certain conditions which did not destroy the power of curing pellagra and of promoting growth it became evident that the so-called vitamin B contained at least two different factors. The anti-neuritic factor was termed vitamin B₁, the pellagra-preventing and growth-promoting factor vitamin B₂. Later on the so-called vitamin B₂ was found to contain at least three factors with different physiological properties, namely, riboflavin, nicotinic acid and pantothenic acid. Moreover, vitamin B preparations obtained from yeast or wheat germ were found to contain still more factors, so that the term vitamin B complex now comprises at least 6, and possibly 9 or 10 different vitamins.

Vitamin B₂ is the term usually applied in this country to the factor riboflavin. In America riboflavin was formerly called vitamin G. Riboflavin is also sometimes referred to as lactoflavin because of the fact that it was first isolated from milk. Severe deficiency of riboflavin affects the lips and eyes and the skin of the face. Riboflavin may be estimated *biologically* by its growth-promoting effect in young rats living on a diet deficient in this factor. *Chemical* estimations are usually based on the measurement of its yellowish fluorescence when exposed to ultra-violet light under suitable conditions. The preliminary extraction of the vitamin is tedious. A *polarographic* method is being investigated. The richest sources of riboflavin are dairy produce, meat, fish, tomatoes, peas, cabbage and spinach. Yeast is usually not as good a source as wheat germ but can be made so by being cultivated under certain conditions.

Nicotinic Acid and Nicotinamide function as vitamins preventing the disease, pellagra which is very rare in this country but very common in the southern states of U.S.A. amongst maize-eating peoples. *Biological estimations* of nicotinic acid are difficult to perform, since the symptoms of deficiency in animals do not lend themselves to exact measurement. There is, however, a satisfactory chemical test based on the production

of a yellow colour when nicotinic acid is treated with freshly prepared cyanogen bromide and a suitable aromatic base such as aniline, metol or *p*-aminoacetophenone. The richest sources of nicotinic acid are yeast and meat offals, especially liver. Meat, fish, wheat germ, soya beans, dried separated milk and dried eggs are also good sources of nicotinic acid.

Pantothenic Acid (probably the same as "filtrate factor"). Deficiency of this factor in rats leads to atrophy of suprarenals, in chicks to degeneration of the spinal cord. Little is yet known about human requirements.

Vitamin B₆ (pyridoxine, adermin) is known to be required for growth of certain micro-organisms and said to be needed to maintain muscle tone in certain parts of the digestive tract, but little is yet known of its precise action or requirements in man. A colour test has recently been introduced, based on the blue colour given with 2 : 6-dichlorobenzoquinonechloroimide.

Vitamin C (ascorbic acid) is a water-soluble factor occurring in highest concentration in fruit juices and green vegetables. Severe deficiency of this vitamin leads to scurvy, with spongy bleeding gums, loosening of the teeth and hæmorrhage. Moderate deficiency causes running at the nose, nose bleeding, lessened resistance to certain diseases and delay in healing of wounds. The biological test for vitamin C depends on cure or prevention of scurvy, usually measured by changes in the microscopic appearance of the teeth of guinea-pigs. Chemical assays are based on the power of the vitamin to reduce instantaneously the dye 2 : 6-dichlorophenolindophenol. The vitamin solution must be strongly acid (pH about 1), using a freshly prepared solution of metaphosphoric acid. When preparing extracts of certain fruits and vegetables for vitamin C assay it is important to avoid destruction of the vitamin by oxidising enzymes liberated from the bruised tissues. These enzymes cannot function in a strongly acid medium, hence the fruit or vegetables are cut into small pieces which are dropped immediately into metaphosphoric acid solution and ground with washed sand. In strongly coloured solutions the colour change at the end-point may be difficult to detect, and it may be necessary to add chloroform to take up the colour of the dye. The end-point may also be detected *potentiometrically* by means of the rise in e.m.f. caused by a slight trace of dye. Recently it has been found that dehydrated foods, malt extract, yeast, molasses and other foodstuffs may contain considerable amounts of substances which reduce the dye but are not vitamin C. This apparent vitamin C can be distinguished from true vitamin C by its different reaction with formaldehyde.

Vitamin P Fruit juices containing vitamin C will cure a tendency to capillary hæmorrhage. Green vegetables equally rich in vitamin C will not effect such cures. Hence the presence of a further factor in fruits has been suggested, and given the name vitamin P because it regulates the permeability of the capillaries. Vitamin P, like vitamin C, appears to be readily destroyed by oxidising agents and is unstable in alkaline solution. A *biological test* for vitamin P recently introduced depends on the prevention of capillary hæmorrhages or petechia in the skin of guinea-pigs when suction is applied to a shaved area. No satisfactory chemical test has yet been discovered, although the cyanidin reaction is said to be

given by most rich sources of the vitamin such as extracts of orange or lemon peel.

Vitamin D was the term originally applied to the factor occurring in liver fats and oils which are capable of curing rickets. When ergosterol, a constituent occurring in very minute traces in vegetable oils, is exposed to ultra-violet light it acquires the same power of curing rickets and irradiated ergosterol was also termed vitamin D. Further investigation showed that the vitamin D from plant sources differs chemically, and to a certain extent physiologically, from the vitamin D occurring in animal fats. Plant vitamin D is now termed D_2 and animal vitamin D is termed D_3 . The *biological assay* of vitamin D depends on the prevention or cure of rickets, usually in rats. The degree of severity of rickets may be measured by X-ray examination of the bones, or by histological examination of the long bones. In man, deficiency of vitamin D is most readily detected by the rise in the concentration of the enzyme phosphatase in the blood. No satisfactory chemical or physical test for vitamin D has yet been devised. The only foods containing pre-formed vitamin D are animal in origin, *e.g.*, milk, butter, eggs, liver and certain other parts of meat and fish. One egg can provide the whole of the daily requirement of vitamin D but all eggs are not as rich in vitamin D as this. Since vitamin D is concerned mainly with the growth of bones and teeth, the requirement of this vitamin is highest in babies and infants.

Vitamin E (tocopherol) is an oil-soluble substance found in wheat germ, rice germ and cottonseed oil and is necessary for satisfactory reproduction in rats, but human need of this vitamin is not yet clearly established, although favourable results have been reported in the treatment of threatened abortion in women. Biological assays of vitamin E are very tedious, and attempts are being made to devise spectroscopic or chemical tests.

Vitamin K is found in green vegetables and in animal and vegetable fats. Deficiency of this factor in chickens leads to anaemia characterised by the blood taking much longer to clot. In man vitamin K has been used with success in treating hæmorrhage associated with obstructive jaundice. Biological, spectroscopic and colour tests are being investigated.

Feeding of Infants and Children

In the diet of infants the proportion of total protein need not be much higher than in the diet of adults, but should come largely from dairy produce. On the other hand, infants should receive a much higher proportion of fat in their diet in order to provide sufficient energy for their more active metabolism. The suitable proportion is indicated in the percentage composition of human milk given on p. 293. Skimmed and separated milks should *not* be used. If human milk is not available modified cow's milk may be used in which the total protein content has been reduced by about half, whilst the fat and lactose is practically unaltered. Such "humanised" milk differs from true human milk in that its protein is less readily digested; it may also carry infection if it has not been pasteurised by heating to 65–70° for half an hour. Attempts to overcome these difficulties have led to the introduction of a variety of

proprietary infant foods, based on dried cows' milk. Such infant foods should be given at intervals of 2-4 hours, and suitable supplements given to provide vitamins A and D (*e.g.*, cod-liver oil) and vitamin C (*e.g.*, orange juice). After weaning, the diet should gradually be made more solid, bread and milk, egg yolk, milk puddings, mashed potatoes and suitable well-cooked vegetables (*e.g.*, carrots) being provided. Rusks are more digestible than bread and help teething.

Children over 2 years old should still receive plenty of milk, supplemented with dairy produce, and can gradually be educated to eat the same diet as adults receive.

Diet in Disease

In *fevers* the general principle should be to supply as much fluid or semi-fluid food as can be tolerated. Milk forms the basis of the diet, and may be enriched with eggs and flavoured with meat or vegetable extracts. In many instances fruit juices are of value. The energy value may be enhanced by addition of glucose, cereal preparations (*e.g.*, arrowroot or cornflour as gruel) or malt extract. Meat extract and beef juice should be avoided if diarrhoea occurs.

In *rheumatic* fever, meat and alcohol should be avoided, and during the height of the attack the diet should consist almost entirely of milk.

In *diabetes mellitus*, the intake of carbohydrates and of fats must be controlled. If the diet provides more carbohydrate than the patient can deal with, the excess is excreted as glucose in the urine. In severe cases the carbohydrate tolerance may be very low, and the carbohydrates of the diet supply only a fraction of the necessary energy. If, however, the missing energy is sought in fat, the limited amount of carbohydrate assimilated may lead to incomplete oxidation of the fat, with the accumulation of toxic substances (*e.g.*, acetoacetic acid) in the blood, and diabetic coma may ensue. The missing energy may in part be obtained from protein, but there is a limit to the proportion of protein which the diet can conveniently contain, and the most satisfactory procedure is to inject insulin in order to enable more carbohydrate to be utilised. It is necessary to balance insulin dosage against carbohydrate intake so as to avoid too great a reduction in the blood sugar. Thus the dietetic treatment of diabetes, whether insulin is used or not, involves a knowledge of the percentage of carbohydrate, fat and protein in the food eaten.

In *obesity*, the increase in body weight may be due to various causes, some of which are not readily controlled by dietetic measures. Amongst foods, fats need to be carefully watched, but it may be dangerous to cut down the consumption of these too severely unless alternative sources of the fat-soluble vitamins are ensured.

In *gout*, benefit may be obtained by limiting the intake of foods such as rich meat soups, sweetbreads, high game and all fish except white fish.

In *gastro-intestinal diseases*, it is important to obtain expert medical advice if any doubt exists as to the nature or progress of the disease. Test meals may have to be employed. Dietetic treatment may be of great value, but the procedure may vary considerably, and details must be sought in suitable textbooks.

VITAMIN CONTENTS OF OFFICIAL PREPARATIONS

The human daily requirement of a vitamin may vary considerably with age, bodily activity and other factors, hence only approximate figures can be given for such requirements. This uncertainty regarding requirements is particularly marked with vitamin D, where the position is complicated by the fact that variable amounts of the vitamin are supplied by the action of sunlight on the patient's skin. It is, however, known that infants may need considerably more of this vitamin than do adults. The official doses of Calciferol and of Liquor Calciferolis are stated for infants. The doses for children would probably be smaller, and for adults smaller still.

Preparation	Minimum Vitamin Content in International Units	Approximate Equivalent of Maximum Official Dose in International Units	Approximate Daily Vitamin Requirement
Vitamin A			
Capsula Olei Hippoglossi, N.W.F.	4500 per capsule	—	5000 i.u. for children or adults.
Liquor Vitamini A Concentratus, B.P.	50,000 per g.	12,500	
Oleum Hippoglossi, B.P.	30,000 " "	7500	
Vitamin D			
Calciferol, B.P.	40,000 per mg.	2000*† 3000 †	Approximately 1000 i.u. for infants. 500 i.u. for children.
Liquor Calciferolis, B.P.	3000 " g.	2000*† 3000 †	
Liquor Vitamini D Concentratus, B.P.	10,000 " "	1500	
Tabellae Calciferolis Compositae, B.P.C.	500 " tablet	1000	
Tabellae Calcii cum Vitamino D, N.W.F.	500 " "	—	
Vitamins A and D			
Capsula Liquoris Vitaminorum A et D Concentrati, N.W.F.	4500 A per capsule 450 D per capsule	9000 A 900 D	5000 i.u. of A for children and adults; 500 i.u. of D for children.
Emulsio Olei Morrhuae, B.P.	300 A per g. 42-5D " "	2000 A 200 D	
Emulsio Olei Morrhuae cum Glycero-phosphatibus, B.P.C.	300 A " " 42-5D " "	9000 A 1275 D	
Emulsio Olei Morrhuae cum Hypo-phosphatibus, B.P.C.	300 A " " 42-5D " "	9000 A 1275 D	
Emulsio Olei Morrhuae et Croceti, B.P.C.	200 A " " 30 D " "	6000 A 900 D	
Emulsio Olei Vitaminati, B.P.	500 A " " 50 D " "	2000 A 200 D	

* = Prophylactic Dose.

† = Daily Dose.

Preparation	Minimum Vitamin Content in International Units	Approximate Equivalent of Maximum Official Dose in Inter- national Units	Approximate Daily Vitamin Requirement
Vitamins A and D—(Contd.)			
Emulsio Olei Vitamin- ati cum Glycerophosphatibus, B.P.C.	500 A per g. 50 D " "	15,000 A 1500 D	5000 i.u. of A for children and adults; 500 i.u. of D for children.
Emulsio Olei Vitamin- ati cum Hypophosphitibus, B.P.C.....	500 A " " 50 D " "	15,000 A 1500 D	
Emulsio Olei Vitamin- ati et Creosoti, B.P.C.	333 A " " 33 D " "	10,000 A 1000 D	
Extractum Malti cum Oleo Morrhue, B.P.	60 A " " 8.5D " "	1500 A 210 D	
Extractum Malti cum Oleo Vitaminato, B.P.....	100 A " " 10 D " "	2500 A 250 D	
Extractum Malti cum Vitaminis, B.P.C.....	760 A " ml. 56 D " "	22,500 A 1680 D	
Liquor Vitaminorum A et D Concentratus, B.P.....	50,000 A " g. 5000 D " "	12,500 A 1250 D	
Oleum Morrhue, B.P.	600 A " " 85 D " "	1200 A* 170 D*	
		3600 A 510 D	
Oleum Vitaminatum, B.P.....	1000 A " " 100 D " "	2000 A* 200 D*	
		6000 A 600 D	
Vitamin B Complex			
Aneurinæ Hydro- chloridum, B.P.....	320,000 per g.	200*† 600 †	500 i.u. for adults.
Tabella Aneurinæ Hydrochloridum, N.W.F.....	960 " tablet	960	
Pulvis Vitaminis B ₁ , B.P.....	100 " g.	200*† 600 †	2.5 mg.
Riboflavina, B.P. ...	—	0.01 g.	
Acidum Nicotinicum, B.P.....	—	0.01 g.	20 mg. for adults
Tabella Acidi Nico- tinici, N.W.F.....	—	50 mg. per tablet	
Nicotinamidum, B.P.	—	0.1 g.	
Vitamin C			
Acidum Ascorbicum, B.P.....	20,000 per g.	1000*† 5000 †	1000 i.u. for adults (50 mg.).
Tabella Acidi Ascor- bici, N.W.F.....	5 mg. tablets 100 50 mg. " 1000	100* per tablet 1000 " "	
Vitamin E			
Tocopheryl Acetas B.P.C.....	—	0.01 g.	

* = Prophylactic Dose. † = Daily Dose.

THE ENDOCRINE ORGANS

An endocrine organ (from the Greek *ἐνδον*, within, and *κρίνω*, I separate) or gland of internal secretion is an organ producing a secretion which is not discharged into a special duct, but contains substances which pass into the blood stream, either directly or by way of the lymphatic system, and are thus conveyed to distant organs or tissues whose functions are thereby affected. The substances contained in these secretions and which, by means of the blood, reach and stimulate other organs are termed hormones (from the Greek *ὁρμῶν*, I excite).

Of the important functions of hormone activity may be mentioned their influence upon skeletal growth, fat distribution, general metabolism, lactation, sexual development and ovulation. Each hormone exercises a specific function in exciting the activity of a particular organ or tissue, and very frequently in affecting the secretion of other hormones.

Those organs which produce external secretions, that is, secretions which are conveyed by means of ducts to other parts of the organism, are sometimes termed exocrine organs. Some organs, such as the pancreas and testis, have a two-fold function producing both internal and external secretions. In a few cases the hormones have been isolated, and obtained in a pure crystalline condition, *e.g.*, adrenaline, insulin, thyroxine, oestrone, oestradiol, progesterone, testosterone, and corticosterone and desoxycorticosterone. Several of these have been synthesised. From the chemical point of view the hormones differ widely in constitution; adrenaline and thyroxine, for example, are of comparatively simple structure, while insulin is a complex substance probably allied to the peptides. Many of the hormones are thermolabile, and are destroyed by the action of enzymes or by being subjected to even a moderate degree of acidity or alkalinity.

The Pituitary Body is a small gland, weighing about 0.6 grammes in man and about 2.5 grammes in the ox. It is situated at the base of the brain and rests in a hollow of the bony structure separating the brain from the facial organs. It consists of anterior and posterior lobes, separated by a cleft. The former constitutes about two-thirds of the gland, while in close contact with the posterior lobe there is a layer of differentiated tissue known as the pars intermedia. The whole gland is connected with the brain by a short stalk, the infundibulum, arising from the posterior lobe.

Histologically and in physiological function the two lobes are quite different.

The Anterior Lobe is now known to secrete several hormones. The following functions are known to be exerted by them but, with the exception of the gonadotrophic substances, there is little evidence of the clinical value of these hormones in man.

I. General Effects on the Whole Body:—

(a) **Effect on Growth.** This effect is exerted in the immature animal or in the animal which, deprived of its pituitary gland, would remain a dwarf unless treated with suitable extracts of the anterior pituitary. Hypersecretion of the anterior lobe leads to gigantism if it occurs in immature subjects and to acromegaly in adults.

(b) **Effect on Carbohydrate Metabolism.** This effect is exerted by the *glycotrophic* or *diabetogenic* hormone, which appears to counteract the influence of insulin in sugar metabolism.

II. Specific Local Effect, Chiefly on Other Glands:—

(i) **Gonadotrophic Substances.** Two substances are secreted by the anterior pituitary which have distinct effects on the sex glands of both sexes but are known by their effects in the female. Extracts act only in the presence of the gonads and not in animals deprived of these glands. They are (a) *Follicle-stimulating* substances (FSH; Prolan A) which stimulate the sperm- and ova-forming tissues and cause the formation of follicles, followed by liberation of oestrogens and their secondary effects, *viz.*, changes in the vaginal smear or growth of the uterus; and (b) *Luteinizing* substances (LH; Prolan B), *i.e.*, substances which cause the formation of corpora lutea and subsequently the liberation of progesterone. In males, LH stimulates growth of the interstitial cells in the testis and liberates androgens which cause enlargement of the prostate and seminal vesicles.

Substances with similar effects to these anterior pituitary hormones occur in other tissues such as blood of pregnant mares (rich in FSH) and human urine of pregnancy (LH).

(ii) **Thyrotrophic Hormone.** This hormone stimulates the growth of the cells of the thyroid gland causing an increase in its weight and in the discharge of colloid containing thyroxine.

(iii) **Corticotrophic Hormone.** Extracts of the anterior pituitary containing this substance cause hypertrophy of the adrenal cortex.

(iv) **Prolactin** (lactogenic hormone). This hormone stimulates the mammary gland to secrete milk, and in pigeons increases the size of the crop glands.

The Posterior Lobe. The most important activities of this are (1) the pressor action, leading to a rise in blood-pressure; (2) the oxytocic action, which affects plain muscle and produces contraction of the uterus; (3) the anti-diuretic action, which is closely associated with the pressor fraction, and absence of which causes the condition known as diabetes insipidus in which large quantities of sugar-free urine are excreted; and (4) the property of stimulating peristalsis. These effects appear to be produced by distinct hormones, all of which are readily extracted by macerating the minced gland with slightly acidified water, boiling to coagulate protein, cooling and filtering.

Extracts of the posterior lobe, or its hormones, are employed for the prevention of post-partum hæmorrhage, for the relief of the symptoms of diabetes insipidus and in the treatment of paralytic ileus.

The *pars intermedia* is thought to elaborate a hormone controlling or concerned with pigment metabolism in special cells in the skin of frogs.

The Thyroid Gland is a highly vascular organ consisting of two lobes attached to the trachea and connected by a middle lobe or isthmus. Each lobe is almond shaped and deep red in colour. Thyroid gland for medicinal use is obtained from the sheep, and then averages about 4.5 grammes in weight. It is employed in the form of an extract or as the powdered desiccated gland. The principal and possibly the only active constituent is known as thyroxine, a crystalline substance which has

been synthesised and which contains 65 per cent. of iodine. Recent knowledge indicates that thyroxine does not occur as such in the thyroid gland; it is probably combined with the protein, or at least with other amino-acids to form a polypeptide.

The thyroid gland exerts a powerful influence upon metabolism. Its hormone not only stimulates metabolism in general, but exercises a detoxicating effect upon the products of protein katabolism and of bacterial activity.

Thyroid hyposecretion produces the condition known in children as cretinism, in adults as myxoedema. Both diseases are successfully treated by the oral administration of the dried gland. Excessive secretion of the gland results in exophthalmic goitre.

The Parathyroid Glands—usually four in number—are situated in or near the thyroid. In the human subject they are very minute and even the gland obtained from the ox weighs only about 0.5 gramme. In spite of their insignificant size the parathyroid glands have an important influence upon the distribution of calcium in the body, maintaining an equilibrium between the bony structures, the tissues and the blood. The serum calcium of normal persons is considered to be about 10 mg. per 100 ml. If, through decreased activity of the parathyroids or other cause, the serum calcium falls below a certain level, hyperexcitability of the nervous system ensues leading to the ultimate development of tetany, which is treated by parathyroid extract from ox or sheep glands. Osteitis fibrosa is a disease resulting from excessive secretion of the parathyroid hormone, the serum calcium reaching an abnormally high figure due to the calcium being withdrawn from the bones which become deformed through being light and brittle.

The parathyroids are thought also to regulate the acid-base equilibrium of the blood, thus preventing acidosis or alkalosis. In addition it has been shown that an acid alcohol extract of the glands—after removal of any calcium-regulating factor—retards the growth of young animals and also inhibits the development of implanted tumours in mice.

In some respects the action of parathyroid extract is resembled by that of dihydrotachysterol, which accompanies calciferol in impure irradiated ergosterol. The parathyroid appears to have a separate and distinctive action on the kidney in regulating phosphate excretion.

The Suprarenal Glands consist of two triangular bodies, one surmounting each kidney. Each is divided into two distinct parts, an outer portion, the cortex, and an inner portion, the medulla. The medulla secretes the important hormone adrenaline which has been prepared in a crystalline condition and has been synthesised.

When injected, adrenaline causes a rise in blood pressure by bringing about a constriction of the blood vessels. Owing to its vasoconstrictor action it is effective when applied to superficial hæmorrhages or inflamed mucous membranes. Adrenaline is also used by injection in the symptomatic treatment of asthma; it rapidly relieves the bronchial spasms, but its action is transient.

The cortex produces a number of hormones, collectively known as cortin, which are essential to health and life, and the absence or deficiency of which causes Addison's disease. Extracts contain several distinct steroid principles, of which corticosterone and twenty-four others

have been isolated. Desoxycorticosterone, having similar actions, has been synthesised. The glandular extract prolongs life in adrenalectomised animals, controls the ions in the blood (especially potassium), regulates carbohydrate metabolism, and alleviates the symptoms of Addison's disease.

The Pancreas performs a dual function; it produces an external secretion which passes through the pancreatic duct into the duodenum and contains digestive zymogens; in addition it produces, in specialised structures (the islets of Langerhans), an internal secretion the active principle of which is insulin. This hormone is essential for the normal metabolism of carbohydrates and controls the amount of sugar in the blood. When the pancreas fails to produce sufficient insulin, the blood sugar rises and the disease known as diabetes mellitus results. The administration of insulin, obtained from the pancreas of oxen, sheep or pigs, relieves the symptoms of diabetes.

Insulin is rapidly destroyed by the trypsin originating from the zymogen, trypsinogen (contained in the external secretion of the pancreas). In isolating the hormone, therefore, the glands must be frozen immediately upon removal from the animal. Extraction of the minced, still frozen glands with acid alcohol removes the insulin while inactivating the enzyme. Commercial insulin is soluble in either acid or alkaline solutions, and is precipitated at from pH 4.5 to pH 5.5.

Insulin has been prepared in a crystalline form and has an isoelectric point at pH 5.6. It is a protein of a complex constitution to which Abel assigned the formula $C_{48}H_{76}O_{17}N_{11}$. It is stable in slightly acid solution, but rapidly loses its activity in alkaline solution. As it is inactivated by pepsin and trypsin it has no effect when administered by the mouth.

Insulin preparations are required to be assayed, using either rabbits or mice, in comparison with standard crystalline insulin of which 1 mg. is defined as containing 22 international units.

The Ovary secretes hormones which govern the development of secondary sex characters and which control, in human beings, the menstrual cycle, and, in animals, the condition of heat or oestrus. The active hormone of the human ovary, formerly called "oestrin", but now known to be oestradiol, is developed in the Graafian follicles and in the non-follicular cells in the ovary. It has the formula, $C_{18}H_{24}O_2$, and is associated in the ovary with the degradation products oestrone ($C_{18}H_{22}O_2$) and oestriol ($C_{18}H_{24}O_3$). Oestradiol is also present in sow's ovaries and in pregnant mare's urine.

The oestrogens whether derived from ovarian substance or obtained by chemical synthesis, are standardised by their oestrus-promoting properties in rodents in comparison with crystalline samples of oestrone and oestradiol benzoate. The international unit is defined as the oestrus-producing activity of 0.001 mg. of the standard preparation, oestrone and oestradiol monobenzoate having separate standards of reference. Preparations are given subcutaneously for disorders associated with ovarian failure, especially at the menopause.

Synthetic preparations, such as stilboestrol and hexoestrol, having similar physiological actions to the naturally occurring oestrogens, are effective either orally or by injection, and are tending to replace the use of the latter.

The **Corpus Luteum**, formed in the site of a discharged ovum, stimulates (if fertilisation has taken place) the growth of the mucous membrane and muscular wall of the uterus. Although morphologically a part of the ovary it represses ovarian function, especially in early pregnancy, and inhibits the action of the posterior pituitary whose secretion would otherwise set up uterine contractions and bring about abortion.

The active principle of the corpus luteum has been isolated and is known as progesterone, $C_{21}H_{30}O_2$. This hormone is obtainable by synthesis from stigmasterol, a sterol found in soya bean, and is excreted in the urine of pregnant women as the inactivated form—pregnenediol. The corpus luteum also secretes hormones which cause relaxation of the pelvic ligaments at the end of pregnancy and produce proliferation of the uterus of castrate animals.

Progesterone—standardised biologically by its proliferation effect on the lining of the uterus of immature rabbits—is used clinically by injection in threatened abortion. A modified progesterone, pregneninonol, produces similar physiological action by mouth.

From the placenta there has been obtained a crystalline substance (emmenin) which has the property of producing precocious sexual maturity in young animals, thus resembling oestradiol.

The **Testes**, in addition to an external secretion, produce, in the interstitial cells of Leydig, an internal secretion which controls the development and maintenance of the secondary male sex characters. The testicular hormone, testosterone $C_{19}H_{28}O_2$, which has been obtained in a crystalline condition from the testes of bulls, nullifies the effects of castration in animals.

The therapeutic value of the testicular hormone is, as yet, of uncertain value, but in the form of the propionate it is much used by intramuscular injection to counteract the effects due to a deficiency of the natural testicular hormone. It has also been employed by percutaneous administration as an ointment in the treatment of certain conditions in the female, such as chronic mastitis.

The **Liver and Stomach** are not yet regarded as endocrine organs, but their proved therapeutic value is such as to warrant their inclusion here.

Whole liver, or its aqueous or alcoholic extract, contains an active principle which has a specific value in the treatment of pernicious anæmia. Following its administration in such cases the formation of red blood cells (and to a less extent that of hæmoglobin) is stimulated, and there is an increase in the number of reticulocytes indicative of increased activity of the bone marrow. Although the administration of liver has a profound influence on the normal morphology of the red blood cells it does not appear to effect the underlying pathological process and continued ingestion of some form of liver diet is necessary to prevent a relapse.

Hogs' stomach tissue or the juice expressed therefrom has been found to be equally active in pernicious anæmia and frequently it is more efficient than liver, apparently supplying some essential factor not present in the latter organ.

VETERINARY POSOLOGICAL TABLE

In many cases dosage for the dog is about the same as that for man, but in prescribing for dogs allowance must be made for the fact that dogs vary much in weight. It is convenient to take as the standard a dog of the size of a fox-terrier (average weight about 20 pounds) and the doses in the following tables are based on this standard. As an approximate guide to the doses suitable for other animals the following scale may be adopted:—

Cats	One half the dose for a dog.
Pigs	Twice the dose for a dog.
Sheep and Goats	Three times the dose for a dog.
Horse	Sixteen times the dose for a dog.
Cattle	Twenty-four times the dose for a dog.

Animals vary somewhat in their susceptibility to certain drugs, so that some exceptions to these general rules must be noted. Thus, for purgative effect aloin must be given to the dog in doses relatively greater than those given to man; calomel, nux vomica and strychnine, on the other hand, must be given to dogs in doses much smaller than the human dose. For cats, the dose of strychnine (and nux vomica) is only one-tenth of the dose for the dog. As a rule, dogs are very tolerant of morphia.

Except where otherwise indicated, the doses given in the following tables indicate the amounts that may be given by mouth with safety to mature animals. That is to say, horses 3 years, ruminants 2 years, pigs 1½ years, dogs and cats 6 months. In prescribing, the size, age and vigour of the animal must be taken into account.

Half doses should be given to animals half these ages, quarter doses to animals a quarter of these ages, and so on. The doses of alkaloids for hypodermic (subcutaneous) injection are one-half the oral dose; the doses for intravenous injection are from one-third to one-quarter of the oral dose.

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Acetanilide	30 to 120 grains	30 to 120 grains	10 grains	10 grains	1 to 5 grains	1 to 2 grains	—
Acetarsol	—	—	8 grains	8 grains	1 to 5 grains	1 to 2 grains	2 to 8 grains (turkeys)
Acetylcholine 10% soln. (intramusc. or hypod.)	60 to 80 minims	60 to 120 minims	—	15 to 30 minims	10 to 15 minims	—	—
Acid Acetylsalicylic	120 to 180 grains	—	—	—	5 to 10 grains	1 to 5 grains	—
Acid Ascorbic (intramusc.)	—	15 grains	—	—	—	—	—
Acid Boric	120 to 240 grains	120 to 240 grains	10 to 30 grains	7 to 20 grains	5 to 15 grains	2 to 5 grains	—
Acid Hydrochloric (Dilute)	60 to 120 minims	60 to 120 minims	10 to 40 minims	10 to 30 minims	5 to 10 minims	2 to 4 minims	—
Acid Hydrocyanic (Dilute)	20 to 60 minims	20 to 60 minims	10 to 15 minims	4 to 6 minims	2 to 5 minims	1 to 2 minims	—
Acid Nicotinic	—	—	—	1 to 2 grains	1 to 1 grain	—	—
Acid Sulphuric (Dilute)	60 to 120 minims	120 to 240 minims	10 to 20 minims	5 to 20 minims	5 to 15 minims	—	—
Acid Tannic	30 to 120 grains	30 to 120 grains	5 to 20 grains	5 to 15 grains	2 to 5 grains	1 to 8 grains	—

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Aconite, Tincture of	10 to 30 minims	60 minims.....	5 to 10 minims...	5 to 10 minims...	1 to 5 minims...	1 to 4 minims...	1 to 3 minims
Aconitine (hypod.)	$\frac{1}{10}$ to $\frac{1}{5}$ grains	—	—	—	—	—	—
Adrenaline Hydrochloride 0.1%	—	—	—	—	—	—	—
solution (hypod.)	60 to 240 minims	60 to 240 minims	20 to 60 minims	10 to 40 minims	2 to 15 minims...	$\frac{1}{4}$ to 2 minims...	$\frac{1}{4}$ to 1 minim
Agar-Agar	—	—	—	—	30 to 120 grains	—	—
Agropyrum, Liquid Extract of	—	—	—	—	—	—	—
Aloes (purgative)	$\frac{1}{4}$ to 1 oz.	1 to 2 ozs.....	120 to 240 grains	120 to 240 grains	60 to 120 minims	—	—
" (stomachic)	30 to 60 grains	60 to 120 grains	15 to 30 grains	15 to 30 grains	10 to 30 grains...	5 to 10 grains...	2 to 8 grains
Aloin (purgative)	90 to 120 grains	—	—	—	2 to 10 grains...	$\frac{1}{4}$ to $\frac{1}{2}$ grains...	—
Alum	—	120 to 240 grains	—	—	—	—	—
Ammonia, Solution of	120 to 240 minims	$\frac{1}{4}$ to 1 fl. oz.	60 minims.....	60 minims.....	5 to 10 minims...	—	—
Ammon. Acet. Solution	—	—	—	—	—	—	—
Ammon. Aromat.	4 to 6 fl. oz.	4 to 6 fl. oz.	$\frac{1}{4}$ to 2 fl. oz.	$\frac{1}{4}$ to 2 fl. oz.	120 to 240 minims	15 to 60 minims	—
Spt.	2 to 4 fl. oz.	2 to 4 fl. oz.	—	—	20 to 60 minims	5 to 10 minims...	—
Ammonium Benzoate	60 to 240 grains	—	—	—	5 to 10 grains	—	—
Ammonium Bromide	$\frac{1}{4}$ to 1 oz.	$\frac{1}{4}$ to $\frac{1}{2}$ oz.	20 to 120 grains	10 to 120 grains	5 to 20 grains...	1 to 5 grains....	—
Ammonium	—	—	—	—	—	—	—
Carbonate	60 to 240 grains	$\frac{1}{4}$ to 1 oz.	15 to 30 grains...	15 to 30 grains...	3 to 8 grains...	—	—
Ammonium Chloride	120 grains	240 grains.....	20 to 30 grains...	20 to 30 grains...	3 to 10 grains...	—	—
Ammon. Nitrite	10 to 60 minims	10 to 60 minims	—	—	1 to 5 minims...	—	—
Aneurine Hydrate (hypod.)	$\frac{1}{4}$ grain.....	$\frac{1}{4}$ grain.....	—	—	$\frac{1}{16}$ to $\frac{1}{8}$ grain...	$\frac{1}{16}$ to $\frac{1}{8}$ gr.	—
Anise, Oil of.....	15 to 40 minims	—	—	—	$\frac{1}{4}$ to $\frac{1}{2}$ grain...	—	—
Anise, Powdered	$\frac{1}{4}$ to 1 oz.	1 to 2 oz.	60 to 180 grains	30 to 120 grains	15 to 60 grains...	—	—
Antim. Pot. Tart.	60 to 120 grains	2 fl. oz. of 2% soln. (intrav.)	5 to 10 grains... (emetic)	5 to 10 grains... (emetic)	1 to 3 grains...	1 to 2 grains.... (emetic)	—
Apomorphine HCl—(oral)	—	—	—	—	—	—	—
(emetic) (hypod.)	—	—	—	—	$\frac{1}{16}$ to $\frac{1}{8}$ grain...	$\frac{1}{16}$ to $\frac{1}{8}$ grain...	—
(expectorant)	—	—	—	—	$\frac{1}{16}$ to $\frac{1}{8}$ grain...	$\frac{1}{16}$ to $\frac{1}{8}$ grain...	—
(hypod.)	—	—	—	—	—	—	—
Arcea, Powdered	$\frac{1}{4}$ to 1 oz.	—	—	—	$\frac{1}{16}$ to $\frac{1}{8}$ grain...	—	—
Arecoline Hydrobrom. (hypod.)	—	—	—	—	10 to 30 grains...	(not safe)	5 to 10 grains
(oral)	$\frac{1}{4}$ to 1 grain...	$\frac{1}{4}$ to 1 grain...	—	—	$\frac{1}{4}$ to 1 grain....	—	—

Arsenic, B.P. Soln.	1 to 1 fl. oz.	1 to 1 fl. oz.	10 to 90 minims	10 to 90 minims	2 to 8 minims.	1 to 5 minims.	1 to 2 minims
Arsenic Trioxide	2 to 8 grains	2 to 8 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Ascorbic Acid (hypod.) ..	120 minims to 1 fl. oz.	120 minims to 1 fl. oz.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Atropine Sulph.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Barium Chloride	60 to 120 grains	120 to 150 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Barium Chloride	8 to 20 grains in 150 to 360 minims of water (intrav.)	120 to 150 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Belladonna, Dry	5 to 15 grains.	10 to 30 grains.	1 to 3 grains.	1 to 3 grains.	1 to 3 grains.	1 to 3 grains.	1 to 2 minims
Extract of	60 to 240 grains	60 to 240 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Belladonna, Leaf	20 to 30 minims	30 to 60 minims	3 to 6 minims.	3 to 6 minims.	3 to 6 minims.	3 to 6 minims.	3 to 6 minims
Extract of	1 to 1 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 minims
Belladonna, Tincture of	60 to 120 grains	120 to 150 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Bismuth	1 to 1 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 minims
Bismuth Carbonate	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 2 minims
Bismuth Subcitrate	15 to 60 grains (foals)	15 to 60 grains (calves)	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Bismuth Subgallate	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 2 minims
Bismuth Subnitrate	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 1 oz.	1 to 2 minims
Bromethol (1 g. per ml.) (rectal)	1 to 1 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 minims
Buchu, Tincture of (1:5)	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 minims
Buckthorn, Syrup of	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 fl. oz.	1 to 2 minims
Caffeine	15 to 60 grains	15 to 60 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Caffeine Citrate	30 to 120 grains	30 to 120 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Caffeine Citrate (hypod.)	7 to 15 grains	7 to 15 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims
Caffeine Sodium Benzoate (hypod.) ..	7 to 15 grains	7 to 15 grains	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 1 grain.	1 to 2 minims

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Calceolol	6000 to 12,000 i.u.	600 to 12,000 i.u.	3000 to 5000 i.u.	2000 to 4000 i.u.	1000 to 3000 i.u.	500 to 1500 i.u.	250 to 750 i.u.
Calcium Chloride (intrav.)	—	480 to 720 grains in 10% soln.	—	—	—	—	—
Calcium Gluconate (intrav.)	2 to 3 oz.	2 to 4 oz.	120 to 240 grains	120 to 240 grains	15 to 50 grains	—	—
Calcium Gluconate (oral)	—	—	‡ to 1‡ oz.	‡ to 1‡ oz.	10 to 30 grains	5 to 20 grains	—
Calcium Hypophosphite	60 to 120 grains	—	—	—	3 to 10 grains	—	—
Calcium Phosphate	60 to 120 grains	60 to 180 grains	5 to 30 grains	10 to 20 grains	5 to 10 grains	1 to 5 grains	—
Calumba, Tincture of	1 to 2 fl. oz.	1 to 2 fl. oz.	60 to 120 minims	60 to 120 minims	30 to 60 minims	—	—
Camphor	60 to 180 grains	120 to 240 grains	20 to 50 grains	20 to 50 grains	2 to 10 grains	1 to 3 grains	1 to 2 grains
Camphor (intramusc.) (dissolved in oil)	20 to 40 grains	—	—	—	1 to 2 grains	—	—
Camphor, Spirit of	‡ to 1 fl. oz.	2 fl. oz.	—	—	5 to 20 minims	5 to 15 minims	—
Cannabis Indica, Extract of	‡ to 1 oz.	—	—	—	‡ to 3 grains	—	—
Cantharides, Tincture of	30 to 60 minims	40 to 80 minims	5 to 15 minims	5 to 15 minims	2 to 5 minims	—	—
Capsicum	‡ to 2 oz.	‡ to 2 oz.	15 to 60 grains	15 to 60 grains	‡ to 5 grains	‡ to 2 grains	‡ to ‡ grain
Capsicum, Tincture of	120 to 240 minims	—	—	—	3 to 15 minims	—	—
Carbachol (1:1000 soln.) (hypod.)	45 to 90 minims	45 to 120 minims	15 to 25 minims	10 to 15 minims	3 to 8 minims	—	—
Carbon Bisulphide	120 to 240 minims	60 to 120 minims	—	—	—	—	—
Carbon Tetrachloride (foals)	7 to 14 fl. dr.	60 to 80 minims	17 minims	1‡ minims per lb. body wt.	2‡ minims per lb. body wt.	—	30 to 60 minims
Cardanum, Comp. Tincture of	—	—	—	—	20 to 60 minims	—	—
Cascara, Dry Extract of	—	—	—	5 to 15 grains	2 to 8 grains	1 to 4 grains	—
Cascara, Liquid Extract of	—	—	—	—	30 to 60 minims	—	—
Castor Oil	1 to 2 pints	1 to 2 pints	2 to 4 fl. oz.	2 to 4 fl. oz.	‡ to 1 fl. oz.	60 to 240 minims	60 to 180 minims
	2 to 3 fl. oz. (foals)	2 to 3 fl. oz.	(calves)				

Catechu.....	60 to 120 grains	60 to 120 grains	30 to 60 grains	30 to 60 grains	5 to 15 grains	2 to 5 grains	2 to 4 grains
Catechu, Compound Powder of.....	180 to 360 grains	—	—	—	10 to 20 grains	—	—
Catechu, Tincture of.....	1 to 2 fl. oz.	1 to 2 fl. oz.	120 to 360 minims	30 to 120 minims	10 to 20 minims	3 to 10 minims	—
Chalk (prepared).....	1 to 2 oz.	2 to 4 oz.	120 to 240 grains	120 to 240 grains	7 to 30 grains	5 to 20 grains	5 to 10 grains
Charcoal, Animal.....	1 to 2 oz.	1 to 2 oz.	—	—	20 to 60 grains	—	—
Chenopodium Oil.....	60 to 240 minims	—	—	5 minims per lb. body wt.	10 to 20 minims	—	—
Chloral Hydrate (rectal).....	1 to 3½ oz.	—	—	—	¼ to 2 minims (puppy)	—	—
Chloral Hydrate (oral).....	1 to 2 oz.	1 to 2 oz.	30 to 120 grains	30 to 120 grains	5 to 20 grains	2 to 10 grains	—
Chloral Hydrate (intrav. for anesthesia).....	4 g. per cwt. in 5-10% solution	—	—	—	—	—	—
Chloralose.....	—	—	1 to ½ grain per lb. body wt. in 1% solution	—	—	1 to 5 grains	—
Chlorbutol.....	1 to 2 fl. oz.	1 to 2 fl. oz.	—	—	2 to 10 grains	—	—
Chloroform.....	1 to 2 fl. oz.	1 to 2 fl. oz.	—	—	5 to 15 minims	2 to 5 minims	2 to 8 minims
Chloroform (oral).....	60 to 120 minims	120 to 240 minims	20 to 40 minims	20 to 40 minims	5 to 10 minims	2 to 5 minims	2 to 4 minims
Cinchona.....	120 to 240 grains	1 oz.	30 to 120 grains	20 to 90 grains	5 to 30 grains	10 to 20 grains	5 to 15 grains
Cinchona, Comp. Tincture of.....	1 to 2 fl. oz.	2 to 4 fl. oz.	1 to 1 fl. oz.	180 to 360 minims	15 to 60 minims	10 to 30 minims	—
Cinnamon, Oil of.....	—	—	—	—	1 to 4 minims	—	—
Cloves, Infusion of.....	—	—	—	—	120 to 240 minims	—	—
Cobalt Chloride.....	—	—	1 to 1 grain for 14 days	—	—	—	—
Cocaine Hydroch. (max. hypod.).....	10 grains	—	—	—	2 grains (large) .. ½ grain (small) ..	½ grain	—
Cod Liver Oil.....	1 to 4 fl. oz.	1 to 4 fl. oz.	60 to 240 minims	60 to 240 minims	30 to 60 minims	30 to 60 minims	15 to 30 minims
Codine Phosphate.....	—	—	—	—	1 to 1 grain	1 to 1 grain	—
Codine Phosphate, Syrup of.....	—	—	—	—	20 to 60 minims	—	—
Colocynth and Hyoscymus Pill.....	—	—	—	—	2 to 8 grains	—	—
Colobony.....	120 to 240 grains	—	—	—	5 to 15 minims	5 to 10 minims	—
Copaiba, Oil of.....	—	—	—	—	6 to 10 grains	1 to 2 grains	—
Copper Sulph.....	—	—	—	—	—	—	(emetie)

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG,	HORSES,	CATTLE,	SHEEP,	PIGS,	DOGS,	CATS,	FOWLS,
Copper Sulph. 1% Solution	—	10 fl. oz. (vermicide)	1 to 3 fl. oz. (vermicide)	—	—	—	—
Cresote	20 to 60 minims	60 to 120 minims	15 minims	5 to 15 minims	1 to 5 minims	$\frac{1}{2}$ to 2 minims	—
Cresote (intratracheal)	—	5 to 10 minims (emulsified calves)	—	—	—	—	—
Croton Oil	5 to 10 minims	10 to 30 minims.	—	—	10 to 30 minims	—	—
Cubeb, Tincture of	—	—	—	—	—	—	—
Dextrose (intramusc.)	—	—	—	—	$\frac{1}{2}$ to 4 fl. oz. of 10% soln.	—	—
Dextrose (intrav.)	2 pints of 20–40% soln.	2 pints of 20–40% soln.	5 to 10 fl. oz. of 20–40% soln.	—	1 to 2 fl. oz. of 20% soln.	—	—
Dextrose (subcut.)	Up to 3 pints of 15% soln.	Up to 3 pints of 15% soln.	—	—	—	—	—
Diamorphine Hydrochloride	$\frac{1}{2}$ to 1 grain.	—	—	—	$\frac{1}{2}$ to $\frac{1}{2}$ grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—
Digitalis, Infusion of	3 to 4 fl. oz.	—	—	—	30 to 120 minims	—	—
Digitalis, Powdered	15 to 30 grains	20 to 60 grains	5 to 10 grains	2 to 5 grains	$\frac{1}{2}$ to 2 grains	$\frac{1}{2}$ to $\frac{1}{2}$ grains	—
Digitalis, Tincture of	120 to 240 minims	$\frac{1}{2}$ to 1 fl. oz.	15 to 30 minims	10 to 15 minims	2 to 10 minims	2 to 5 minims	—
Emetine Bismuth Iodide	—	—	—	—	$\frac{1}{2}$ to $\frac{1}{2}$ grains	—	—
Emetine Hydroch. (subcut.)	3 to 6 grains	3 to 6 grains	—	—	—	—	—
Ephedrine Hydroch.	—	—	—	—	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—	—
Ergometrine (intramusc.)	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—	$\frac{1}{2}$ grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—
Ergot, Liquid (oral)	—	—	—	—	$\frac{1}{2}$ to $\frac{1}{2}$ grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—
Ergot, Extract of	80 to 120 minims	60 to 120 minims	10 to 30 minims	10 to 30 minims	5 to 20 minims	3 to 10 minims	—
Ergot, Prepared	$\frac{1}{2}$ to 1 oz.	$\frac{1}{2}$ to 1 oz.	60 to 90 grains	60 to 90 grains	15 to 20 grains	—	—
Ergotoxine	—	—	—	—	—	—	—
Ethanosulphonate	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—	$\frac{1}{2}$ to $\frac{1}{2}$ grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	$\frac{1}{2}$ to $\frac{1}{2}$ grain	—
Eucalyptus, Oil of	60 to 240 minims	60 to 240 minims	20 to 60 minims	15 to 30 minims	15 to 30 minims	$\frac{1}{2}$ to 3 minims	—

Ferric Chloride, Solution of,	‡ to 1 fl. oz.	‡ to 2 fl. oz.	10 to 30 minims	5 to 20 minims ..	1 to 10 minims ..	2 to 6 minims ..	2 to 10 minims
Ferrous Carbonate, Saccharated	120 to 240 grains	—	20 to 60 grains ..	20 to 60 grains ..	5 to 15 grains ..	2 to 6 grains	1 to 5 grains
Ferrous Iodide, Syrup of,	1 fl. oz.	—	—	—	30 minims	—	—
Ferrous Phosphate, Comp. Syrup of, ..	1 fl. oz.	—	—	60 minims	30 to 60 minims	—	—
Ferrous Phosphate, Comp. Syrup of with Quinine and Strychnine	—	—	—	—	—	—	—
(Eaton's)	30 to 120 grains	120 to 480 grains	10 to 30 grains ..	10 to 20 grains ..	5 to 30 minims ..	2 to 10 minims ..	1 to 3 grains
Ferrous Sulphate ..	—	—	—	—	1 to 5 grains	‡ to 4 grains	—
Formaldehyde, Solu- tion of,	‡ to 2 fl. oz.	‡ to 2 fl. oz.	—	—	—	—	—
(well diluted, by stomach tube)	—	—	—	—	—	—	—
Formaldehyde, Solu- tion of (intrav.) ..	120 minims in 2 pints saline	—	—	—	5 to 10 minims in 60 to 120 minims of water	—	—
Gamboge	—	‡ to 1 oz.	20 to 30 grains ..	30 to 60 grains ..	5 to 20 grains ..	1 to 5 grains	1 to 5 grains
Gentian, Comp. Tincture of	‡ to 1 oz.	‡ to 2 oz.	60 to 180 grains	60 to 120 minims	1 to 1 minim ..	—	—
Gentian, Extract of ..	1 to 2 fl. oz.	1 to 2 fl. oz.	—	60 to 120 minims	2 to 10 grains ..	—	—
Ginger,	—	—	—	—	10 to 20 grains ..	2 to 5 grains	3 to 6 grains
Ginger, Strong Tincture of	‡ to 1 oz.	‡ to 2 oz.	60 to 120 grains	30 to 60 grains ..	3 to 5 minims ..	—	—
Ginger, Weak Tincture of	60 to 120 minims	120 to 240 minims	—	—	5 to 20 minims ..	—	—
Glycerin (senna) Glycerophosphates, Comp. Syrup of...	1 to 2 fl. oz.	2 to 4 fl. oz.	—	—	240 minims	—	—
Glycerin (senna) Comp. Syrup of...	4 to 8 fl. oz.	—	—	—	30 to 60 minims	—	—
Glycerol Trinitrate, Solution of	25 to 50 minims	25 to 50 minims	—	1 to 2 minims ..	‡ to 2 minims ..	—	—
Gonadotropin (Mare's Serum) ...	250 to 1500 i.u. ...	250 to 1500 i.u. ...	50 to 500 i.u.	100 to 200 i.u. ...	—	—	—
Gonadotropin, (Pregnancy Urine)	250 to 1000 i.u. ...	250 to 1000 i.u. ...	200 to 300 i.u. ...	150 to 250 i.u. ...	100 to 200 i.u. ...	—	10 i.u.
Hæmatotoxylum, Decoction of	6 to 8 fl. oz.	6 to 8 fl. oz.	—	—	‡ to 1 fl. oz.	—	—

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Halibut Liver Oil	15 to 60 minims	15 to 60 minims	2 to 8 minims. . .	2 to 8 minims. . .	1 to 5 minims. . .	½ to 3 minims. . .	¼ to 3 minims
Hexamine	80 to 120 grains	—	—	—	—	—	—
Hyocaine Hydro- bromide (hyod.)	½ to ⅓ grain . . .	¼ to ½ grain. . . .	—	—	add to ½ grain	—	—
Hyocyanate Sulph. (hyod.)	½ to ⅓ grain . . .	—	—	—	add to ½ grain	—	—
Hyoscyamus, Dry Extract of	10 to 40 grains . .	10 to 40 grains . .	—	—	¼ to 1 grain. . . .	—	—
Hyoscyamus, Liquid Extract of	60 to 120 minims	60 to 120 minims	5 to 15 minims . .	2 to 10 minims . .	3 to 6 minims. . .	¼ to 1 minim . .	—
Hyoscyamus, Tincture of	1 to 2 fl. oz. . . .	1 to 2 fl. oz. . . .	30 to 120 minims	30 to 90 minims	10 to 40 minims	10 to 30 minims	—
Insulin	100 to 250 units	100 to 250 units	—	—	5 to 50 units . . .	—	—
Iodine	15 to 30 grains . .	30 to 60 grains . .	—	—	¼ to ½ grain. . . .	—	—
Ipecacuanha, Liq. Extract of	15 to 60 minims	60 to 120 minims	30 to 60 minims	5 to 15 minims . .	¼ to 2 minims. . .	¼ to 1 minim . .	—
Ipecacuanha, Powdered	60 to 90 grains . .	—	—	2 to 6 grains (expect.)	¼ to 2 grains (expect.)	¼ to 1 grain (expect.)	—
Ipecacuanha, Tincture of	¼ to 1 fl. oz. . . .	—	—	15 to 50 grains (emetic)	15 to 30 grains (emetic)	5 to 15 grains (emetic)	—
Ipecacuanha, with Opium Powder	60 to 240 grains	—	—	—	5 to 30 minims (expect.)	5 to 15 minims (expect.)	1 to 5 minims (expect.)
Iron and Ammonium Citrate	—	—	—	—	180 to 360 minims (emetic)	60 to 120 minims (emetic)	—
Iron and Quinine Citrate	—	—	—	—	5 to 15 grains . . .	2 to 10 grains . .	—
Jalap, Powdered	—	—	—	60 to 120 grains	5 to 10 grains . . .	—	—
					5 to 10 grains . . .	—	—
					10 to 30 grains . . .	10 to 20 grains . .	10 to 20 grains

Jalap, Comp. Powder of	60 to 120 minims	60 to 120 minims	15 to 30 minims	120 to 360 grains 5 to 15 minims...	10 to 60 grains 1 to 10 minims...	—	—
Juniper Oil	—	—	—	—	30 to 120 grains 7 to 20 grains...	15 grains	—
Kamala	—	—	—	—	5 to 15 grains 15 to 30 minims	—	—
Kino, Compound Powder of	—	—	—	—	—	—	—
Kino, Tincture of	—	—	—	—	—	—	—
Lead Acetate	30 to 60 grains 1 to 1 pint	30 to 60 grains 1 to 2 pints	4 to 8 fl. oz.	2 to 6 fl. oz.	1 to 2 grains 2 to 2 fl. oz.	30 to 90 minims	30 to 60 minims
Linsed Oil	—	—	—	—	—	—	—
Liquorice, Compound Powder of	—	—	—	—	60 grains 2 to 10 minims...	—	—
Liquorice, Liq. Ext. of	60 to 360 minims	1 to 1 fl. oz.	15 to 60 minims	10 to 40 minims	2 to 10 minims Amount equal to 2-6 oz. of fresh liver	1 to 5 minims...	—
Liver, Dry Extract of	—	—	—	—	—	—	—
Liver, Liquid Extract of	—	—	—	—	80 to 360 minims	—	—
Magnesium Carbonate	30 to 180 grains (foals)	30 to 180 grains (calves)	10 to 30 grains (lambs)	10 to 50 grains	5 to 30 grains	3 to 10 grains...	—
Magnesium Oxide	30 to 180 grains (foals)	30 to 180 grains (calves)	10 to 30 grains (lambs)	10 to 50 grains	5 to 30 grains	—	—
Magnesium Sulphate	1 to 4 oz.	1 to 1 lb. 3 to 4 oz. (calves)	3 oz.	3 oz.	60 to 180 grains	10 to 30 grains	10 to 60 grains
Magnesium Sulphate (febrifuge)	2 to 3 oz.	—	—	—	10 to 20 grains	—	—
Male Fern, Liquid Extract of	1 to 1 oz.	1 to 1 oz.	60 grains	60 grains	15 to 60 grains (not safe)	1 to 3 grains	—
Mercuric Iodide (Red)	5 grains	10 grains	—	—	—	—	—
Mercurchrome	1 fl. oz. of 2% soln. (intrav.)	—	—	—	—	—	—
Mercurous Chloride	60 to 120 grains	60 to 120 grains	15 to 30 grains	15 to 30 grains	1 to 1 grain (with caution)	1 to 1 grain...	—
Mercury with Chalk	5 to 15 grains (foals)	5 to 15 grains (calves)	—	—	1 to 4 grains	1 to 1 grain...	—
Mercury Pill	—	—	—	—	2 to 4 grains	2 to 4 grains	—
Mersaly, Inject. of	—	—	—	—	8 to 30 minims	8 to 30 minims	—
Morphine Hydrochloride (hypod.)	5 to 10 grains	5 to 10 grains	1 to 1 grain	1 to 1 grain	1 to 2 grains (or 1/16 grain per lb.)	—	1/16 grain
Morphine, Solution of	1 to 2 fl. oz.	1 to 2 fl. oz.	30 to 120 minims	30 to 120 minims	5 to 20 minims	—	—

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Mustard, Volatile	—	—	120 to 240 minims	—	—	—	—
Oil of	120 grains	—	—	—	—	—	—
Myrrh	60 to 180 grains	60 to 180 grains	10 to 20 grains	10 to 20 grains	.2 to 10 grains	—	—
Naphthalene	45 to 65 grains	—	—	—	—	—	1½ grains
Neosphenamine (intrav.)	—	10 fl. oz. of a 1:100 dilution	—	—	—	—	—
Nicotine Sulphate (40% soln.)	—	60 to 120 grains	10 to 20 grains	10 to 15 grains	.4 to 20 grains .1 to 3 grains (great care)	—	—
Nikethamide (intrav.)	—	—	—	—	—	—	—
Nux Vomica	20 to 60 grains	—	—	—	—	—	—
(stomachic)	1 to 1 oz.	—	—	—	—	—	—
(intestinal stimulant)	5 to 20 grains	10 to 25 grains	.2 to 5 grains	1 to 3 grains	.5 to 1½ grain (great care)	—	—
Nux Vomica, Dry Extract of	20 to 60 minims	60 to 90 minims	10 to 20 minims	8 to 15 minims	.1 to 1 minim (great care)	—	—
Nux Vomica, Liquid Extract of	1 to 1 fl. oz.	1 fl. oz.	15 to 60 minims	5 to 20 minims	.2 to 10 minims (great care)	—	1 to 3 minims
Nux Vomica, Tincture of	50,000 i.b.u.	25,000 to 50,000 i.b.u.	20,000 i.b.u.	20,000 i.b.u.	200 to 5000 i.b.u.	—	—
Cetratriol Benzote	60 to 120 grains	120 to 180 grains	10 to 30 grains	5 to 20 grains	.1 to 1 fl. oz.	—	—
Olive Oil	—	—	—	—	.1 to 2 grains	—	—
Opium, Dry Extract of	—	—	—	—	.1 to 1 grain.	—	—
Opium, Liquid Extract of	1 to 2 fl. oz.	1 to 2 fl. oz.	30 to 120 minims	30 to 120 minims	5 to 20 minims	—	—
Opium, Tincture of	2 to 4 fl. oz.	2 to 4 fl. oz.	60 to 120 minims	60 to 120 minims	.2 to 5 minims	—	.2 to 6 minims
Opium, Camph. Tinct. of	2 to 4 fl. oz.	2 to 4 fl. oz.	60 to 120 minims	60 to 120 minims	5 to 30 minims	—	—
Ox Bile, Extract of ..	—	—	—	—	5 to 15 grains	—	—

Papaveretum (hypod.)	1 to 2 pints	1 to 2 pints	6 to 10 fl. oz.	6 to 10 fl. oz.	1 to 1 grain. 30 minims to 1 fl. 20 to 60 minims	—
Paraffin (Liquid)	—	—	—	—	oz.	—
Parathyroid, Liquid	—	—	—	—	2 to 15 units	—
Extract of	—	—	—	—	—	—
Pentobarbital	—	—	—	—	—	—
Sodium	20 to 60 minims	30 to 90 minims	5 to 20 minims	5 to 20 minims	but anaesthesia is assessed as injection proceeds	—
Peppermint, Oil of	40 to 60 grains	40 to 60 grains	—	—	5 to 10 grains	—
Pepsin	—	—	—	—	—	—
Pepsin, Glycerin of	120 to 240 grains	180 to 360 grains	30 grains	30 grains	15 to 30 minims	10 to 20 minims
Phenacetin	120 to 240 grains	180 to 360 grains	30 grains	30 grains	5 to 10 grains	1 to 2 grains
Phenazone	120 to 240 grains	180 to 360 grains	30 grains	30 grains	5 to 10 grains	1 to 2 grains
Phenobarbitone	—	—	—	—	5 to 10 grains	—
Phenobarbitone, Soluble	—	—	—	—	5 to 10 grains	—
Phlorid, Liquefied	15 to 40 minims	30 to 60 minims	5 to 10 minims	5 to 10 minims	1 to 2 minims	1 to 1 minim
B.P.	—	—	—	—	2 to 5 grains	—
Phenolphthalein	1 to 1½ oz.	1 to 2½ oz.	½ to 1 oz.	60 grains	4 to 20 grains	6 to 15 grains
Phenothiazine	—	—	—	—	—	—
Physostigmine Salicyl.	½ to 2 grains	½ to 2 grains	—	—	—	—
(hypod.)	—	—	—	—	—	—
Pilocarpine Nitrate	2 to 3 grains	2 to 5 grains	½ to 1 grain	½ to 1 grain	½ to 1 grain	—
(hypod.)	—	—	—	—	—	—
Plutary, Liquid	—	—	—	—	—	—
Extract of	85 to 150 minims	85 to 150 minims	30 to 60 minims	30 to 60 minims	5 to 15 minims	3 to 5 minims
(Pectoric)	15 to 40 grains	15 to 40 grains	2 to 4 grains	1 to 3 grains	½ to 1 grain	½ to 1 grain
Podophyllum, Resin	—	—	—	—	—	—
Podophyllum	60 to 240 grains	240 grains	60 grains	60 grains	5 to 15 minims	—
Tincture of	—	—	—	—	5 to 15 minims	—
Potassium Acetate	1 to 1½ oz.	1 to 1½ oz.	30 to 60 grains	30 to 60 grains	4 to 20 grains	2 to 5 grains
Potassium Bicarbonate	1 to 1½ oz.	1 to 1½ oz.	30 to 60 grains	30 to 60 grains	10 to 40 grains	2 to 3 grains
Potassium Bromide	1 to 1½ oz.	1 to 1½ oz.	15 to 60 grains	15 to 60 grains	10 to 20 grains	1 to 2 grains
Potassium Chlorate	120 grains	240 grains	20 to 40 grains	20 to 40 grains	5 to 15 grains	2 to 6 grains
Potassium Citrate	60 to 120 grains	120 to 240 grains	20 to 40 grains	20 to 40 grains	3 to 10 grains	1 to 2 grains
Potassium Iodide	60 to 120 grains	120 to 240 grains	20 to 40 grains	20 to 40 grains	3 to 10 grains	1 to 2 grains
Potassium Nitrate	60 to 120 grains	120 grains	30 grains	30 grains	2 to 10 grains	1 to 4 grains
Potassium Permanganate (antidote to Opium)	120 grains	—	—	—	10 to 15 grains	—
Potassium Tartrate	—	—	—	—	5 to 40 grains	—
Acid	—	—	—	—	—	—

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Procaine Hydrochloride (local).	1 to 1½ fl. oz. of 1% or 2% soln.	(Subcutaneously, sufficient 2% solution for requirement of operation) 1 to 1½ fl. oz. of 1% soln.	1 to 2% soln.	1 to 2% soln.	1 to 2% soln.	1 to 2% soln.	—
(epidural).	1 to 3 fl. oz. of 2% soln.	1 to 3 fl. oz. of 2% soln.	1 to 2% soln.	1 to 2% soln.	1 to 2% soln.	1 to 2% soln.	—
Progesterone.	—	—	—	—	—	—	—
Quassia, Tincture of	1 to 2 fl. oz.	1 to 2 fl. oz.	60 to 120 minims	60 to 90 minims	30 to 60 minims	—	—
Quinine, Ammoniated Solution of B.P.	—	—	—	—	20 to 30 minims	—	—
Quinine HCl Acid (hypod.).	—	—	—	—	1 to 2 grains not stronger than 10% solution ..	—	—
Quinine Sulphate (antipyretic)	60 to 90 grains ..	120 to 180 grains	5 to 20 grains	2 to 15 grains	2 to 5 grains	1 to 2 grains	1 to 3 grains
Quinine Sulphate (bitter stomachic) ..	30 to 60 grains ..	60 to 120 grains	5 to 15 grains	5 to 15 grains	1 to 2 grains	1 to 1 grain	—
Rhubarb	120 grains (foals)	120 grains (calves)	—	—	15 to 30 grains	3 to 10 grains	2 to 5 grains
Rhubarb, Comp. Powder of	120 to 240 grains (foals)	120 to 240 grains (calves)	—	—	10 to 60 grains	—	—
Rhubarb, Comp. Tincture of	—	—	—	—	30 to 60 minims	—	—
Salol	120 to 240 grains	—	—	—	3 to 10 grains	1 to 2 grains	—
Salicin	60 to 180 grains	—	—	—	5 to 15 grains	—	—
Santonin	30 to 60 grains ..	30 to 90 grains ..	10 to 15 grains	5 to 10 grains	1 to 5 grains	1 to 2 grains	1 to 2 grains
Scammony, Comp. Fill of	—	—	—	—	2 to 6 grains	—	—
Scammony, Comp. Powder of	60 to 180 grains	—	—	8 to 20 grains	3 to 10 grains	—	—

Sodium Ammono- arsenate (subcut.)	7 to 10 grains in- crease to 60 grains. 3 to 5 grains (foals)	—	—	—	—	—	2 to 4 gr. per lb. body wt. (intramusc.) 6 to 10 grains per lb. body wt. (oral)
Sodium Benzoate.....	60 to 240 grains	—	—	—	—	5 to 10 grains.....	—
Sodium Bicarbonate.....	120 to 240 grains	1 to 1 oz.....	30 to 60 grains..	30 to 60 grains..	5 to 20 grains.....	5 to 20 grains.....	—
Sodium Bicarbonate (intrav.).....	—	3 to 4 pints 8% solution	—	—	—	—	—
Sodium Bromide.....	1 to 1 oz.....	1 to 1 oz.....	15 to 60 grains..	15 to 60 grains..	10 to 20 grains..	1 to 5 grains.....	—
Sodium Cacodylate (intrav.).....	30 to 60 grains..	—	—	—	1 to 3 grains.....	—	—
Sodium Chloride (stomachic and purgative).....	2 to 3 oz.....	2 to 6 oz.....	1 to 1½ oz.....	—	60 to 120 grains (emetice)	—	—
Sodium Hypo- phosphite.....	60 to 120 grains	—	—	—	3 to 10 grains... 1 to 5 grains.....	—	—
Sodium Iodide.....	60 to 120 grains	—	20 to 40 grains..	20 to 40 grains..	3 to 10 grains... 1 to 2 grains.....	—	—
Sodium Iodide (intrav.).....	—	1 to 2 oz. in 1 to 1 pint of water	—	—	—	—	—
Sodium Nitrite.....	20 to 30 grains..	420 minims of 10% solution (intrav.)	170 minims of 10% solution (intrav.)	—	1 to 2 grains..... 1 to 1 grain.....	—	—
Sodium Phosphate Acid.....	—	—	—	—	10 to 40 grains... 10 to 30 grains... 10 to 30 grains... 5 to 10 grains...	—	—
Sodium Salicylate.....	1 to 4 oz.....	—	—	—	—	—	—
Sodium Sulphate.....	2 oz.....	1 to 1 lb.....	2 to 4 oz.....	1 to 2 oz.....	—	—	—
Sodium Thiosulphate (oral).....	1 to 1 oz.....	1 to 1 oz.....	—	—	—	—	—
Sodium Thiosulphate (intrav.).....	—	5 fl. oz. of 10% solution	1 fl. oz. of 10% solution	—	—	—	—
Spirit of Chloroform.....	1 fl. oz.....	2 fl. oz.....	120 to 240 minims	120 to 240 minims	30 to 40 minims	—	—
Spirit of Ether (1:9).....	1 to 2 fl. oz.....	2 to 3 fl. oz.....	—	—	20 to 60 minims	6 to 25 minims... 3 to 12 minims	—
Spirit of Nitrous Ether.....	1 to 3 fl. oz.....	2 to 4 fl. oz.....	120 to 240 minims	120 to 240 minims	20 to 60 minims	5 to 20 minims... 5 to 20 minims	—
Squill Syrup of.....	1 to 1 fl. oz.....	1 to 1 fl. oz.....	20 to 120 minims	20 to 120 minims	10 to 30 minims	10 to 25 minims	—
Squill Tincture of.....	1 to 1 fl. oz.....	—	—	—	2 to 15 minims... 5 to 15 minims...	—	—
Squill Vinegar of.....	120 to 240 minims	—	—	—	—	—	—

VETERINARY POSOLOGICAL TABLE—(continued)

NAME OF DRUG.	HORSES.	CATTLE.	SHEEP.	PIGS.	DOGS.	CATS.	FOWLS.
Stilboestrol							
Dipropionate	$\frac{1}{2}$ to 1 grain.	$\frac{1}{2}$ to 1 grain.	$\frac{1}{8}$ grain.	$\frac{1}{4}$ grain.	$\frac{1}{16}$ to $\frac{1}{8}$ grain.	—	—
Streptanthin (hypod.)	grain.	—	—	—	$\frac{1}{32}$ to $\frac{1}{16}$ grain.	—	—
Tincture of							
Streptanthin	40 to 80 minims	40 to 80 minims	3 to 10 minims	3 to 5 minims	1 to 3 minims.	—	—
Strychnine							
Hydrochloride	$\frac{1}{2}$ to 1 grain.	$\frac{1}{2}$ to 1 grain.	$\frac{1}{2}$ to 1 grain.	$\frac{1}{8}$ to $\frac{1}{4}$ grain.	$\frac{1}{32}$ to $\frac{1}{8}$ grain (great care)	—	—
Strychnine, Hydrochloride (hypod.)	1 grain.	$\frac{1}{2}$ grain.	$\frac{1}{2}$ grain.	$\frac{1}{8}$ grain.	$\frac{1}{32}$ grain (great care)	—	—
Strychnine, Solution of, B.P.	60 to 120 minims	60 to 120 minims	20 to 30 minims	3 to 10 minims.	$\frac{1}{2}$ to 2 minims. (great care)	—	1 to 2 minims
Sulphanilamide (Statin)	2 to 4 oz.	3 to 4 oz.	120 to 240 grains	14 to 20 grains	14 to 20 grains	2 to 3 grains	—
followed by	1 oz. t.i.d.	1 to 2 oz. t.i.d.	60 to 120 grains	5 grains twice daily	5 grains twice daily	2 to 3 grains t.i.d.	—
Sulphanilamide (foals)	120 to 240 grains	(calves)	lambs				
(Statin)	120 to 240 grains	120 to 240 grains	30 to 60 grains	—	—	—	—
followed by	40 to 60 grains t.i.d.	40 to 60 grains t.i.d.	15 to 30 grains	—	—	—	—
Sulphapyridine (Statin)	2 to 2½ oz.	2½ oz.	120 to 150 grains	grain per lb.	7½ to 30 grains	2 to 3 grains	—
followed by	1 oz. t.i.d.	1 oz. t.i.d.	60 to 90 grains	grain per lb.	7½ to 30 grains	2 to 3 grains	—
Sulphapyridine (foals)	90 to 180 grains	(calves)	(lambs)				
(Statin)	90 to 180 grains	90 to 180 grains	15 grains	—	—	—	—
followed by	40 to 60 grains t.i.d.	40 to 60 grains t.i.d.	7½ grains t.i.d.	—	—	—	—
Sulphonal	2 to 3 oz.	—	—	—	—	—	—
Sulphur (alterative)	$\frac{1}{2}$ to 1 oz.	$\frac{1}{2}$ to 1 oz.	60 to 120 grains	60 to 120 grains	10 to 40 grains (large)	5 to 10 grains	5 to 10 grains
Sulphur (laxative)	1 to 2 oz.	3 to 4 oz.	$\frac{1}{2}$ to 1 oz.	$\frac{1}{2}$ to 1 oz.	3 to 30 grains (small)	30 to 60 grains	60 to 120 grains

Terbene	1 to 2 fl. oz.	2 to 4 fl. oz.	60 to 180 minims	30 to 120 minims	2 to 20 minims ..	—	—
Tetanus Antitoxin (prophylactic)	500-1500 units ..	—	—	—	—	—	—
(therapeutic)	10,000-30,000 units	—	—	—	—	—	—
Tetrachlorethylene ..	1 to 4 fl. oz.	—	40 to 75 minims	40 to 150 minims	15 to 75 minims	3 to 8 minims. ...	15 minims
Theobromine Sod. Sol.	—	—	—	—	5 to 15 grains ...	—	—
Theophylline Eby- lene Diamine	—	—	—	—	$\frac{1}{2}$ grain per lb. (oral)	—	—
					$\frac{1}{2}$ grain per lb. (intrav.)	—	—
					$\frac{1}{15}$ to $\frac{1}{2}$ grain per lb. (intramusc.)	—	—
Thymol	$\frac{1}{2}$ to 1 oz.	30 to 60 grains (calves)	—	—	—	—	—
Thyroid (dried)	—	—	—	—	$\frac{1}{16}$ to 5 grains	—	—
Thyroxine Sodium ..	—	—	—	—	$\frac{1}{16}$ to $\frac{1}{8}$ grain (hypod.)	—	—
Tolu, Syrup of	—	—	—	—	10 to 30 minims	—	—
Trypan Blue 1% solution (intrav.) ..	—	5 to 7 fl. oz.	—	—	30 to 220 minims	—	—
Turpentine, Oil of ..	1 to 2 fl. oz.	2 to 4 fl. oz.	60 to 180 minims	30 to 120 minims	—	—	—
		Calves 6 months, 60 minims	—	—	—	—	—
Valerian, Ammoniated Tincture of	1 to 2 fl. oz.	—	—	—	15 to 60 minims (not safe)	—	—
Veratrine	1 to 5 grains	2 to 5 grains	—	—	—	—	—
Veratrine (hypod.) ..	$\frac{1}{4}$ to 1 grain	1 to 3 grains	—	—	—	—	—
Vitamin A	30,000 to 60,000 i.u.	15,000 to 25,000 i.u.	10,000 to 20,000 i.u.	5,000 to 15,000 i.u.	2,000 to 6,000 i.u.	1,000 to 3,000 i.u.	—
Vitamin E	$\frac{1}{2}$ grain	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to 1 grain	—
Yohimbine HCl.	1 grain	1 $\frac{1}{2}$ to 14 grain	1 grain	1 grain	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to 1 grain	—
Zinc Sulphate (astringent)	—	—	—	—	$\frac{1}{2}$ to 1 grain	$\frac{1}{2}$ to 1 grain	—
Zinc Sulphate (emetic)	—	—	—	5 to 20 grains	1 to 3 grains	3 to 10 grains	—

MATERIA MEDICA OF

*This table includes the crude drugs and oils of the British
Chemist Qualifying and B.*

Name of Drug	Brief Definition	Natural Origin and Family
Acacia	Dried gummy exudation from stem and branches	<i>Acacia senegal</i> and some other species of <i>Acacia</i> . Leguminosæ.
Aconitum	Dried root	<i>Aconitum Napellus</i> . Ranunculacæ.
Adeps.....	Purified internal fat	<i>Sus scrofa</i> . Suidæ.
Adeps Lanæ	Purified anhydrous fat-like substance obtained from wool of sheep	<i>Ovis aries</i> . Bovidæ.
Agar.....	Dried gelatinous substance...	<i>Gelidium corneum</i> , <i>G. cartilagineum</i> and other closely allied Rhodophyceæ. Gelidiacæ.
Aloe (Cape).....	The residue obtained by evaporating to dryness the liquid which drains from the cut leaves	<i>Aloe ferox</i> . Liliacæ.
Aloe (Curaçao)	The residue obtained by evaporating to dryness the liquid which drains from the cut leaves	<i>Aloe vera</i> var. <i>officinalis</i> . Liliacæ.
Aloe (Socotrine)	The residue obtained by evaporating to dryness the liquid which drains from the cut leaves	<i>Aloe Peryi</i> and probably other species. Liliacæ.
Aloe (Zanzibar)	The residue obtained by evaporating to dryness the liquid which drains from the cut leaves	<i>Aloe Peryi</i> and probably other species. Liliacæ.
Amylum .	Polysaccharide granules obtained from the grains of maize and rice	<i>Zea Mays</i> , <i>Oryza sativa</i> . Gramineæ.
Anethum.....	Dried ripe fruits	<i>Anethum graveolens</i> . Umbelliferae.
Anthemis	Dried double or semi-double flower heads	<i>Anthemis nobilis</i> . Compositæ.
Asafoetida	Oleo-gum-resin from the living rhizome, and root	<i>Ferula fetida</i> , <i>F. ruscifolia</i> and other species of <i>Ferula</i> . Umbelliferae.
Aurantii Cortex ...	Fresh or dried peel of the ripe, or nearly ripe, fruit	<i>Citrus Aurantium</i> . Rutacæ.

VEGETABLE AND ANIMAL ORIGIN

Pharmacopœia and the syllabuses for the Pharmaceutical Pharm. (London) Examinations.

Geographical Source	Chief Constituents and Pharmacopœial Requirements
Senegambia and the Upper Nile districts ..	Chiefly diarabinantetragalactanisoeddic acid (arabin) in combination with calcium, magnesium and potassium. Oxidising, peroxidising and diastasic ferments. Losses, when dried at 100°, not more than 15% of its weight. Ash, not more than 5%.
England and Germany ..	Aconitine (0.3 to 0.6%), picraconitine and aconine. Contains not more than 2% of other organic matter.
Domesticated everywhere	Stearin and palmitin (total = about 40%), olein (about 60%). Must comply with tests for the absence of beef-fat, of sesame oil, of cotton-seed oil, of alkalis, and of chlorides.
Domesticated everywhere	Cholesteryl and ischolesteryl alcohols combined with lanoceric, lanopalmitic, carnaubic, myristic and to some extent other acids. Must comply with tests for the absence of free alkali and for limit of chlorides. Losses, when heated at 100° for one hour, not more than 0.5% of its weight. Leaves, on incineration, not more than 0.15% of residue.
Japan	A sulphuric ester of calcium corresponding to the formula $R(O\cdot SO_3\cdot O)_2Ca$. Ash not more than 5%.
Cape Colony	Barbaloin, a trace of isobarbaloin, β -barbaloin, resin and aloe-emodin. Losses, when dried at 100°, not more than 10% of its weight. Ash, not more than 5%.
Curaçao, Aruba, and Bonaire	Barbaloin, isobarbaloin, β -barbaloin, resin and aloe-emodin. Losses, when dried at 100°, not more than 10% of its weight. Ash, not more than 5%.
Socotra and on the African and possibly on the Arabian mainland	Barbaloin, β -barbaloin, resin and aloe-emodin. Losses, when dried at 100°, not more than 10% of its weight. Ash, not more than 5%.
Eastern Africa ..	Barbaloin, β -barbaloin, resin and aloe-emodin. Losses, when dried at 100°, not more than 10% of its weight. Ash, not more than 5%.
United States of America, and to a small extent Germany, Canada and Great Britain, etc.	Polymerised amylose, amylopectin and amylo-hemicellulose. Losses, when dried at 100°, not more than 14% of its weight. Ash, not more than 0.5%.
Germany and England ...	Volatile oil (about 3 to 4%) containing carvone. Contains not more than 2% of other organic matter. Ash, not more than 11%.
Britain, Belgium, and France	Volatile oil (about 0.2%).
Eastern Iran and Western Afghanistan	Resin (40 to 64%), gum (25%) and volatile oil (6 to 17%). Ash, not more than 15%. Contains not more than 50% of matter insoluble in alcohol (90%) when assayed by the official process.
South of Spain, Sicily....	Volatile oil, aurantiamarin.

Name of Drug	Brief Definition	Natural Origin and Family
Balsamum Peruvianum	Viscid balsam exuded from the trunk, after the bark has been beaten and scorched	<i>Myroxylon Pereiræ.</i> Leguminosæ.
Balsamum Tolutanum	Solid or semi-solid balsam obtained by incision from the trunk	<i>Myroxylon Toluifer</i> Leguminosæ.
Belladonnæ Folium ...	Leaves and tops, collected when the plant is in flower, and dried	<i>Atropa Belladonna</i> or <i>A. lutescens</i> (acuminata). Solanaceæ.
Belladonnæ Radix	Dried root	<i>Atropa Belladonna</i> or <i>A. lutescens</i> (acuminata). Solanaceæ.
Benzoinum.	Balsamic resin obtained from the incised stem	<i>Styrax Benzoin</i> Styracæ.
Buchu.....	Dried leaves	<i>Barosma betulina.</i> Rutaceæ.
Calumba	Dried of or transverse slices of root	<i>Jateorhiza palmata.</i> Menispermaceæ.
Cannabis	Dried flowering and fruiting tops of the pistillate plants	<i>Cannabis sativa.</i> Cannabinaceæ.
Cantharis	Dried beetles	<i>Cantharis vesicatoria.</i> Meloidæ.
Capsicum	Dried ripe fruits	<i>Capsicum minimum.</i> Solanaceæ.
Cardamomum	Dried ripe, or nearly ripe, seeds separated from the fruits when required for use	<i>Elettaria Cardamomum</i> var. <i>minuscule.</i> Zingiberaceæ.
Carum	Dried ripe fruits	<i>Carum Carvi.</i> Umbellifereæ.

Geographical Source	Chief Constituents and Pharmacopœial Requirements
San Salvador and probably other parts of Central America	A fluid portion called cinnamein (consisting of benzyl benzoate and benzyl cinnamate) and a resinous portion consisting of esters of cinnamic and benzoic acids with an alcohol about which nothing definite is known. Contains not less than 53% of balsamic esters, which have a saponification value of not less than 235. Must comply with tests for the absence of fatty oils, of benzaldehyde and of turpentine.
Colombia and San Salvador	Oily liquid (consisting of benzyl benzoate and benzyl cinnamate), traces of vanillin, free aromatic acids, and resin (yielding by saponification toluresinotannol, and cinnamic acid, associated with benzoic acid). Contains 19 to 25% of free balsamic acids, and 35 to 50% of total balsamic acids, both being calculated with reference to the dry alcohol-soluble matter. Must comply with the test for the absence of colophony.
England, Central and Southern Europe and India	Hyoscyamine and atropine (total being about 0.4 to 1.0% the greater part of which is hyoscyamine) and β -methyl-asculetin. Contains not less than 0.3% (Indian belladonna leaves 0.15%) of the alkaloids of Belladonna Leaf, calculated as hyoscyamine. Acid-insoluble ash, not more than 3%, stem wider than 5 mm. not more than 3%; other foreign organic matter, not more than 2%.
England, Central and Southern Europe and India	Hyoscyamine and atropine (total alkaloid varies from 0.3 to 0.6%, rarely rising to 1%). Contains not less than 0.4% (Indian belladonna root 0.25%) of the alkaloids of Belladonna Root, calculated as hyoscyamine. Acid-insoluble ash, not more than 2%; crowns and stem bases not more than 10% (Indian belladonna root 25%); other foreign organic matter, not more than 2%.
Sumatra	Esters of cinnamic and benzoic acids, associated with the free acids; the alcohols in combination with the acids are benzoresinol and probably coniferyl alcohol. Traces of benzaldehyde, vanillin, etc. Contains not less than 19%, and not more than 29%, of free balsamic acids, and not less than 30%, and not more than 60% of total balsamic acids, both being calculated with reference to the dry alcohol-soluble matter. Ash, not more than 2%.
Cape Colony	Volatile oil and mucilage. Contains not more than 5% of stems, and not more than 2% of other organic matter. Ash, not more than 5%.
Portuguese East Africa..	Columbamine, palmatine and jateorhizine. Starch. Contains not more than 2% of other organic matter. Ash, not more than 9%.
Tropical districts of India Africa	Resin containing cannabinol. Choline.
Southern Europe	Cantharidin (0.4 to 0.8%) and fat (about 12%).
Southern India, Africa (Sierra Leone and Zanzibar) and South America	Capsaicin (about 0.14%). Contains not more than 3% of calices and pedicels, and not more than 1% of stalks and other organic matter. Ash, not more than 7%.
Southern India and Ceylon	Volatile oil (3 to 8%), starch. Contains not more than 3% of other organic matter. Ash, not more than 6%.
Central and Northern Europe, chiefly Holland	Volatile oil (3.5 to 6%) containing carvone. Contains not more than 2% of other organic matter. Ash, not more than 9%; acid-insoluble ash, not more than 1.5%.

Name of Drug	Brief Definition	Natural Origin and Family
Caryophyllum	Dried flower-buds	<i>Eugenia aromatica</i> . Myrtaceæ.
Cascara Sagrada	Dried bark collected at least one year before use	<i>Rhamnus Purshiana</i> . Rhamnaceæ.
Cassia	Pulp from ripe fruits	<i>Cassia Fistula</i> . Leguminosæ.
Catechu	Dried aqueous extract pre- pared from the leaves and young shoots	<i>Uncaria gambier</i> . Rubiaceæ.
Gera Alba	Wax obtained from the honey- comb	<i>Apis mellifica</i> and pos- sibly other species of <i>Apis</i> . Apidæ.
Gera Flava		
Cinchona (Calisaya) ...	Dried stem and root bark of cultivated trees	<i>Cinchona Calisaya</i> . Rubiaceæ.
Cinchona (Ledger bark)	Dried stem and root bark of cultivated trees	<i>Cinchona Ledgeriana</i> . Rubiaceæ.
Cinchona (pale or crown cinchona)	Dried stem and root bark of cultivated trees	<i>Cinchona officinalis</i> . Rubiaceæ.
Cinchona (red bark)....	Dried stem and root bark of cultivated trees	<i>Cinchona succirubra</i> . Rubiaceæ.
Cinnamomum.	Dried inner bark of the shoots of coppiced trees	<i>Cinnamomum zeylanicum</i> . Lauraceæ.
Coca (Bolivian)	Dried leaves	<i>Erythroxylum Coca</i> . Erythroxylaceæ.
Coca (Peruvian)	Dried leaves	<i>Erythroxylum truxil- lense</i> . Erythroxylaceæ.
Cocculus Indicus	Dried ripe fruits	<i>Anamirta paniculata</i> . Menispermaceæ.

Geographical Source	Chief Constituents and Pharmacopoeial Requirements
Molucca Islands, Zanzibar and Pemba	Volatile oil (15 to 20%), gallotannic acid and fatty oil. Contains not more than 5% of its stalks, and not more than 1% of other organic matter. Ash, not more than 10%; acid-insoluble ash, not more than 0.75%.
North California, Oregon, Washington and British Columbia	Emodin, principal purgative constituent is unknown. Contains not more than 2% of other organic matter. Ash, not more than 6%.
India	Mucilage, pectin, hydroxymethyl-antraquinones and sugar.
Malay Archipelago	Catechin (7 to 33%) and catechu-tannic acid (22 to 50%). Water-insoluble matter, dried at 100°, not more than 25%. Alcohol-insoluble matter, dried at 100°, not more than 30%; the alcohol-insoluble matter contains not more than an occasional starch grain. Losses, when dried at 100°, not more than 10% of its weight. Ash, of the powdered drug, not more than 8%.
Imported from Jamaica, California, Chili, Egypt, Syria, Madagascar, and Morocco	Melissyl palmitate, cerotic acid and cerolein. The Ratio Number, <i>ester value</i> divided by <i>acid value</i> , lies between 3.3 and 4.0. When boiled with aqueous soda, cooled, filtered and acidified with hydrochloric acid, under the conditions prescribed in the Pharmacopoeia, the solution does not become turbid. When refluxed with alcoholic potash under the conditions prescribed in the Pharmacopoeia, and allowed to cool, the liquid does not become cloudy above 61°, but becomes cloudy between 61° and 59°, and precipitation of large flocks occurs at not more than 2 degrees below the point at which the liquid becomes cloudy.
Java	Quinine, cinchonidine, cinchonine and quinidine (total alkaloids = 6 to 7%). Quinic acid and cinchotannic acid. Contains not more than 2% of other organic matter, and not less than 6% of the total alkaloids of Cinchona, of which not less than one-half consists of quinine and cinchonidine. Ash, not more than 4%.
Java and India	Quinine, cinchonidine, and cinchonine (Java bark contains from 5 to 10% of total alkaloids). Quinic acid and cinchotannic acid. Contains not more than 2% of other organic matter, and not less than 6% of the total alkaloids of Cinchona, of which not less than one-half consists of quinine and cinchonidine. Ash, not more than 4%.
India	Quinine, cinchonidine and cinchonine (total alkaloids = about 6%). Quinic acid and cinchotannic acid. Contains not more than 2% of other organic matter, and not less than 6% of the total alkaloids of Cinchona, of which not less than one-half consists of quinine and cinchonidine. Ash, not more than 4%.
Java and India	Quinine, cinchonidine, cinchonine and quinidine (total alkaloids, Java = about 3.25%, Indian = about 6.5%). Quinic acid and cinchotannic acid. Contains not more than 2% of other organic matter, and not less than 6% of the total alkaloids of Cinchona, of which not less than one-half consists of quinine and cinchonidine. Ash, not more than 4%.
Ceylon	Volatile oil (1 to 2%), tannin and mucilage. Ash, not more than 7%; acid-insoluble ash, not more than 2%.
Bolivia, Huanuco, Brazil, etc.	Cocaine, cinnamyl-cocaine, α - and β -truxillines.
Northern Peru	Cocaine, cinnamyl-cocaine, α - and β -truxillines.
Eastern India and the Malay Archipelago	Picrotoxin (1.0 to 1.5%).

Name of Drug	Brief Definition	Natural Origin and Famil
Coccus	Dried female insects containing eggs and larvæ	<i>Dactylopius coccus</i> . Coccidæ.
Colchici Cormus	Fresh corms; or corms deprived of their coats, sliced transversely and dried at a temperature not exceeding 65°	<i>Colchicum autumnale</i> . Liliacæ.
Colchici Semen	Dried ripe seeds	<i>Colchicum autumnale</i> . Liliacæ.
Colocynthis	Dried pulp of the fruit	<i>Citrullus Colocynthis</i> . Cucurbitacæ.
Colophonium	Residue left after distilling the volatile oil from the oleo-resin, turpentine	Various species of <i>Pinus</i> . Pinacæ.
Copaiba	Oleo-resin obtained by incision from the trunk	Various species of <i>Copaifera</i> . Leguminosæ.
Coriandrum	Dried ripe fruits	<i>Coriandrum sativum</i> . Umbelliferæ.
Digitalis Folium	Leaves rapidly dried at a temperature between 55° and 60° as soon as possible after collection	<i>Digitalis purpurea</i> . Scrophulariacæ.
Ergota	Dried sclerotium of the fungus	<i>Claviceps purpurea</i> , (Hyphomycetacæ) on <i>Secale cereale</i> (Gramineæ).
Filix Mas	Dried rhizome and leaf bases, collected late in the autumn, divested of the roots and dead portions, and carefully dried and not older than one year from the date of collection	<i>Dryopteris Filix-mas</i> . Polypodiaceæ.
Fœniculum	Dried ripe fruits collected from cultivated plants	<i>Fœniculum vulgare</i> . Umbelliferæ.
Gelatinum .	Product obtained from certain animal tissues, such as skin, tendons, ligaments, and bones, by extracting them with boiling water, evaporating the aqueous extract, and drying the residue in air	Various animals.

Geographical Source	Chief Constituents and Pharmacopœial Requirements
Canary Islands	Carminic acid (about 10%). Contains not more than 2% of other organic matter. No insoluble powder separates from the whole insect when placed in water. Ash, not more than 7%.
England, Central and Southern Europe	Colchicine (about 0.5%) and starch. Contains not more than 2% of other organic matter. The dried corm contains not less than 0.25% of colchicine.
England, Central and Southern Europe	Colchicine (0.4 to 0.8%). Contains not more than 2% of other organic matter, and not less than 0.3% of colchicine. Ash, not more than 3%.
North Africa, Syria, Iran, North West India, Spain and Cyprus	Alkaloid, resins and a glycosidic substance. Contains not more than 5% of the seeds, and not more than 2% of the outer sclerenchymatous part of the pericarp. Acid-insoluble ash, not more than 8%. By continuous extraction with light petroleum (boiling-point, 50° to 60°), it yields not more than 3% of extractive dried at 100°.
United States of America	α -, β - and γ -abietic acids, resene, volatile oil and bitter principle. Ash, not more than 0.1%.
Brazil and the north of South America	Resin, volatile oil (35 to 50%). Four drops of the volatile oil, obtained by distillation in steam or under reduced pressure, when added to a mixture of 1 drop of nitric acid and 3 ml. of glacial acetic acid produce no red or purple colour. A clear solution is obtained on the addition of solution of ammonia in the proportions specified in the Pharmacopœia. When heated on a water-bath, no odour of turpentine is observed; and after all the volatile oil has been driven off not less than 50% and not more than 65% of residue remains; the residue, when cold, is hard and brittle.
Russia, Central Europe, Northern Africa, Malta, and India	Volatile oil (about 1%). Contains not more than 2% of other organic matter. Ash, not more than 7%; acid-insoluble ash, not more than 1%.
Widely distributed throughout Europe	Digitoxin, gitoxin, digitalein, gitalin, and an oxydase. Contains not more than 2% of other organic matter. Losses, when dried at 100°, not more than 8% of its weight. Acid-insoluble ash, not more than 5%.
Russia, Poland, Spain, and Portugal	Ergotoxine, ergometrine, ergotinine and ψ -ergotinine. Contains not more than 2% of other organic matter, and not less than 0.2% of the total alkaloids of Ergot, calculated as ergotoxine of which not less than 15% consists of water-soluble alkaloids of Ergot, calculated as ergometrine.
Great Britain	Filmarone, albaspidin, flavaspidic acid. Contains not more than 2% of other organic matter. Crystals of calcium oxalate absent. Ash, not more than 6%; acid-insoluble ash, not more than 2%.
South of France, Saxony, Russia, India, Japan, etc.	Volatile oil (3 to 4%). Contains not more than 2% of other organic matter. Ash, not more than 12%.
Great Britain, etc.	Glutin. Hot aqueous soln. (2% w/v) is odourless, and, on cooling, forms a transparent or translucent jelly. Must conform to the limit-test for acidity, using N/10 sodium hydroxide soln., as directed by the Pharmacopœia. Sulphur dioxide limit, 1000 parts per million. Not more than 2% of residue remains after incineration.

Name of Drug	Brief Definition	Natural Origin and Family
<i>Gentiana</i>	Dried rhizomes and roots.....	<i>Gentiana lutea</i> . Gentianaceæ.
<i>Glycyrrhiza</i> .	Peeled root and peeled subterranean stem; or the same in an unpeeled condition	<i>Glycyrrhiza glabra</i> and other species of <i>Glycyrrhiza</i> . Leguminosæ.
<i>Hamamelis</i>	Dried leaves	<i>Hamamelis virginiana</i> . Hamamelidaceæ.
<i>Hyoscyamus</i>	Dried leaves and flowering tops	<i>Hyoscyamus niger</i> . Solanaceæ.
<i>Ipecacuanha</i>	Dried roots	<i>Cephaelis Ipecacuanha</i> . Rubiaceæ.
<i>Ipomœa</i>	Dried roots	<i>Ipomœa orizabensis</i> . Convolvulaceæ.
<i>Jalapa</i>	Dried tubercles	<i>Ipomœa purga</i> . Convolvulaceæ.
<i>Krameria</i>	Dried root	<i>Krameria triandra</i> . Polygalaceæ.
<i>Limonis Cortex</i> .	Outer part of the fresh pericarp	<i>Citrus Limonia</i> . Rutaceæ.
<i>Linum</i>	Dried ripe seeds	<i>Linum usitatissimum</i> . Linaceæ.
<i>Lobelia</i>	Dried aerial parts	<i>Lobelia inflata</i> . Campanulaceæ.
<i>Mel</i>	Saccharine substance deposited by the hive bee in the cells of the honeycomb	<i>Apis mellifica</i> and other species of <i>Apis</i> . Apidæ.
<i>Myristica</i>	Dried kernels of the seeds....	<i>Myristica fragrans</i> . Myristicaceæ.
<i>Myrrha</i>	Oleo-gum-resin from the stem	<i>Commiphora molmol</i> and possibly other species of <i>Commiphora</i> . Burseraceæ.
<i>Nux Vomica</i>	Dried ripe seeds	<i>Strychnos Nux-vomica</i> . Loganiaceæ.
<i>Oleum Abietis</i>	Volatile oil distilled from fresh leaves	<i>Abies sibirica</i> . Coniferæ.

Geographical Source	Chief Constituents and Pharmacopoeial Requirements
Central Europe and Spain	Gentian, gentiamarin, gentisin and gentianose. Contains not more than 2% of other organic matter. Water-soluble extractive, not less than 33%; ash, not more than 6%.
Southern Europe, chiefly Sicily and Spain	Glycyrrhizin (consisting of the calcium and potassium salts of glycyrrhizic acid). Water-soluble extractive, not less than 20%; ash of the peeled drug, not more than 6%; ash of the unpeeled drug, not more than 10%; acid-insoluble ash, not more than 2.5%.
United States and Canada	Gallic acid, tannin and a trace of volatile oil. Contains not more than 2% of other organic matter, and not more than 3% of stems.
Whole of Europe extending to Iran and India	Hyoscyamine together with smaller quantities of atropine and hyoscyne (total alkaloids vary from 0.045 to 0.14%); volatile bases. Contains not more than 2% of other organic matter, not more than 1% of its stems having a width greater than 5 mm., and not less than 0.05% of the alkaloids of hyoscyamus calculated as hyoscyamine. Ash, not more than 20%; acid-insoluble ash, not more than 12%.
Brazil (Mattogrosso, Minas and Manaus) ..	Emetine, cephaeline, and a small proportion of psychotrine, methylpsychotrine and emetamine. Contains not more than 1% of other organic matter, and not less than 2% of the total alkaloids of ipecacuanha, calculated as emetine, of which not less than 55% consists of non-phenolic alkaloids, calculated as emetine. Ash, not more than 5.0%.
Mexican Andes	Resin (about 10 to 20%). Yields, when extracted with alcohol (90%), a resin which has the properties described under "Scammonium Resina."
Eastern slopes of the Mexican Andes	Resin (about 9 to 20%). Contains not more than 2% of other organic matter, and not less than 9% of resin.
Peru and Bolivia	Kramerianic acid (about 8.4%), krameria-red. Contains not more than 2% of other organic matter Ash, not more than 5%. Volatile oil and hesperidin.
Countries bordering on the Mediterranean	Fixed oil (about 30 to 40%), mucilage. Contains not more than 2% of other organic matter.
Most temperate and tropical regions	Lobeline, lobelidine, lobelanine, lobelandidine and isrolobelanine. Contains not more than 60% of stems, and not more than 2% of other organic matter. Acid-insoluble ash not more than 5%.
Eastern States of North America, cultivated for medicinal use in the States of New York and Massachusetts	Dextrose and levulose.
England, California, Chili and Jamaica	Volatile oil (about 8 to 15%) and solid fat (about 25 to 30%).
Moluccas, Penang, Sumatra and the East Indies	Resin (25 to 40%), gum (57 to 61%) and volatile oil (2.5 to 8%). Contains not more than 4% of other organic matter. Ash, not more than 9%. Contains not more than 70% of matter insoluble in alcohol (90%).
North-Eastern Africa and Southern Arabia	Strychnine, brucine (total alkaloids = 1.8 to 5.3%) and loganin. Contains not more than 1% of other organic matter, and not less than 1.2% of strychnine.
India and the Malay Archipelago	Bornyl acetate, pinene, camphene, dipentene and phellandrene. Contains 33-45% w/w of esters, calculated as bornyl acetate.
North-East Russia	

Name of Drug	Brief Definition	Natural Origin and Family
Oleum Amygdalæ...	Fixed oil expressed from seeds	<i>Prunus communis</i> var. <i>dulcis</i> or <i>Prunus communis</i> var. <i>amara</i> . Rosaceæ.
Oleum Amygdalæ Volatile Purificatum	Volatile oil distilled from cake after expression of fixed oil and removal of hydrocyanic acid	<i>Prunus communis</i> var. <i>amara</i> , <i>Prunus Persica</i> , or <i>Prunus Armeniaca</i> . Rosaceæ.
Oleum Anethi.....	Volatile oil distilled from dried ripe fruits	<i>Anethum graveolens</i> . Umbelliferae.
Oleum Anisi	Volatile oil distilled from dried ripe fruits	<i>Pimpinella anisum</i> . Umbelliferae. <i>Illicium verum</i> . Magnoliaceæ.
Oleum Arachis....	Fixed oil expressed from	<i>Arachis hypogæa</i> . Leguminosæ.
Oleum Cadinum....	Oily liquid obtained by destructive distillation of branches and wood	<i>Juniperis Oxycedrus</i> . Pinaceæ.
Oleum Cajuputi....	Volatile oil distilled from fresh leaves	<i>Melaleuca Leucadendron</i> and other <i>Melaleuca</i> species. Myrtaceæ.
Oleum Cari	Volatile oil distilled from freshly crushed fruits	<i>Carum carvi</i> . Umbelliferae.
Oleum Caryophylli .	Volatile oil distilled from dried flower buds	<i>Eugenia aromatica</i> . Myrtaceæ.
Oleum Chenopodii .	Volatile oil steam distilled from fresh flowering and fruiting plants, excluding roots	<i>Chenopodium ambrosioides</i> var. <i>anthelminticum</i> . Chenopodiaceæ.
Oleum Cinnamomi .	Volatile oil distilled from bark	<i>Cinnamomum zeylanicum</i> . Lauraceæ.
Oleum Coriandri ..	Volatile oil distilled from dried ripe fruits	<i>Coriandrum sativum</i> . Umbelliferae.
Oleum Eucalypti...	The rectified oil distilled from fresh leaves	Various species of <i>Eucalyptus</i> . Myrtaceæ.
Oleum Gossypii Seminis	Fixed oil expressed from seeds	Various species of <i>Gossypium</i> . Malvaceæ.
Oleum Hippoglossi..	Fixed oil extracted from fresh or suitably preserved liver	<i>Hippoglossum vulgaris</i> . Gadidæ.
Oleum Hydnocarpi..	Fatty oil obtained by cold expression from fresh ripe seeds	<i>Hydnocarpus Wightiana</i> . Flacourtiaceæ.
Oleum Lavandulæ...	Volatile oil distilled from fresh flowering tops	<i>Lavandula officinalis</i> . Labiatae.
Oleum Limonis	Volatile oil expressed from peel	<i>Citrus Limonia</i> . Rutaceæ.

Geographical Source	Chief Constituents and Pharmacopœial Requirements
Mediterranean countries.	Olein with a small proportion of the glycerides of linolic and other acids. Remains clear for 3 hours at -10° and does not congeal until -18° . Complies with tests for absence of cottonseed, arachis and sesame oils.
Mediterranean countries.	Benzaldehyde. Contains not less than 95% of benzaldehyde and complies with tests for absence of hydrocyanic acid and limit of chlorinated compounds.
Germany and England ...	Carvone, limonene and phellandrene. Contains 43-63% of carvone.
Spain, Southern Russia and Bulgaria. China.	About 80 to 90% of anethole, methyl chavicol. Complies with limit test for lead. Freezing point not below 15° , melting point, not below 17° .
Brazil. Cultivated elsewhere	Chiefly glyceride of oleic acid, together with glycerides of arachidic, hypogæic, linoceric and linolic acids. Complies with tests for absence of sesame, cottonseed and other vegetable oils.
Mediterranean districts of North Africa, France and Spain	A high percentage of cadinene, $C_{15}H_{22}$. Complies with test for absence of pine tar oil.
Northern Australia, Malay Archipelago	Cineole, terpineol and its acetic ester; valeric, butyric benzoic and other aldehydes. Contains 50-65% w/w of cineole.
Central and Northern Europe	Carvone, carvene. Contains 53-63% w/w of carvone.
Malucca Islands, Zanzibar and Pemba	Eugenol, carophyllene and fufural. Contains 85-90% v/v of eugenol.
Southern U.S.A. and Central America.	Ascaridole, <i>p</i> -cymene, α -terpinene and <i>l</i> -limonene. Contains not less than 65% w/w of ascaridole.
Ceylon.	Cinnamic aldehyde, eugenol and phellandrene. Contains 50-65% w/w of cinnamic aldehyde and complies with test for absence of cinnamon leaf oil and cassia oil.
Russia, Central Europe, Northern Africa and India	Coriandrol, α -pinene, β -pinene, terpinene, decyl aldehyde, geraniol and borneol.
Australia	Cineole, α -pinene and other terpenes. Contains not less than 70% w/w of cineole and complies with limit tests for phellandrene and aldehydes.
U.S.A., Egypt and India	Glycerides of palmitic, stearic, oleic and linolic acids. Particles of solid fat begin to separate at below 12° and oil congeals at 0° to -5° . Complies with tests for absence of sesame and arachis oils.
.....	Contains in 1 g. not less than 80,000 units of vitamin A.
India	Glycerides of chaulmoogric and hydnocarpic acids.
England and France.....	Linalyl acetate, linalol, pinene, limonene and geraniol. Contains 7-12% w/w of esters (English oil) or not less than 35% w/w of esters (foreign oil), calculated as linalyl acetate, $C_{15}H_{21}O_2$.
Mediterranean countries.	Citral, citronellal, geranyl acetate, α -limonene, terpinene and phellandrene. Leaves 2 to 3% w/w of non-volatile residue. Contains not less than 4% w/w of aldehydes, calculated as citral.

Name of Drug	Brief Definition	Natural Origin and Family
Oleum Lini	Fixed oil obtained by cold expression from seeds	<i>Linum usitatissimum</i> . Linaceæ.
Oleum Menthae Piperitæ	Volatile oil distilled from fresh flowering tops	<i>Mentha piperita</i> . Labiatae.
Oleum Morrhuae	Fixed oil expressed from fresh liver, and freed from solid fat by filtration at about 0°	<i>Gadus morrhua</i> . Gadidae.
Oleum Myristicæ ...	Volatile oil distilled from nutmegs	<i>Myristica fragrans</i> . Myristicaceæ.
Oleum Olivæ	Fixed oil expressed from ripe fruits	<i>Olea europæa</i> . Oleaceæ.
Oleum Ricini	Fixed oil expressed from seeds	<i>Ricinus communis</i> . Euphorbiaceæ.
Oleum Rosmarini	Volatile oil distilled from flowering tops	<i>Rosmarinus officinalis</i> . Labiatae.
Oleum Santali	Volatile oil distilled from dried heartwood	<i>Santalum album</i> . Santalaceæ.
Oleum Santali Australiæ	Volatile oil distilled from wood	<i>Eucarya spicata</i> . Santalaceæ.
Oleum Sesami	Fixed oil expressed from seeds	<i>Sesamum indicum</i> . Pedaliaceæ.
Oleum Terebinthinæ .	Volatile oil distilled from the oleo-resin	<i>Pinus palustris</i> , <i>P. maritima</i> and other <i>P.</i> species. Coniferales.
Oleum Theobromatis	Solid fat expressed from roasted seeds	<i>Theobroma cacao</i> . Sterculiaceæ.
Opium	Latex obtained by incision from the unripe capsules and inspissated by spontaneous evaporation	<i>Papaver somniferum</i> . Papaveraceæ.
Pix Liquida	Bituminous liquid obtained from wood by destructive distillation	Various trees of the Family Pinaceæ.
Podophyllum	Dried rhizome and roots.....	<i>Podophyllum peltatum</i> . Berberidaceæ.

Geographical Source	Chief Constituents and Pharmacopœial Requirements
Russia, U.S.A., Northern Ireland and France	Glycerides of linolic, linolenic and isolinolenic acids. Complies with tests for absence of resin and resin oils, and of cottonseed oil, sesame oil and arachis oil.
England, France, Germany, Russia and America	Menthol, menthyl acetate, menthyl isovalerate, menthion, cineole, inactive pinene, <i>l</i> -limonene and phellandrene. Contains 4-9% w/w of esters, calculated as menthyl acetate, $C_{15}H_{25}O_2$, and not less than 46% w/w of free menthol, $C_{10}H_{18}O$.
Near the coasts of Norway and Newfoundland	Jecolein, therapin, palmitin, morrhaine, asselline and vitamins A and D. Remains bright when cooled to 0° and kept at that temperature for 3 hours. Must contain per g. not less than 600 units of vitamin A and not less than 85 units of antirachitic activity (vitamin D).
Moluccas and Malay Archipelago	<i>d</i> -Camphene, <i>d</i> -pinene, dipentene, <i>d</i> -borneol, <i>l</i> -terpineol, geraniol, safrole, myristicin. Leaves not more than 3.0% of non-volatile residue.
Countries bordering on the Mediterranean, California	Olein with small amounts of palmitin, linolein, and arachin. Complies with tests for absence of cottonseed, sesame and arachis oil.
Italy and India	Glycerides of ricinoleic and <i>isoricinoleic</i> acids and small amounts of the glycerides of stearic and dihydroxy-stearic acids. Remains bright when kept at 0° for 3 hours.
South of France and Dalmatian Islands	Bornyl acetate, borneol, camphor, cineole, pinene and camphene. Contains not less than 2% w/w of esters calculated as bornyl acetate and not less than 9% free alcohols calculated as borneol. Complies with limit test for cineole.
Southern India	Santalol, esters of santalol and santalal. Contains not less than 2% w/w of esters calculated as santalyl acetate, and not less than 90% free alcohols calculated as santalol.
West Australia	Alcohols isomeric with the santalols. Contains not less than 90% w/w of alcohols calculated as santalol.
India, China and Japan .	Glycerides of oleic and linoleic acids, with small proportions of the glycerides of stearic, palmitic and myristic acids. Complies with tests for absence of cottonseed and arachis oils.
America, France and Russia	Hydrocarbons, principally Δ -3 carene (Indian, Russian and Scandinavian oils), <i>d</i> - and <i>l</i> -pinene (American and French oils); resin acids, camphene and fenchene. Leaves not more than 0.5% of non-volatile residue.
West coast of Africa, Ecuador and Brazil	Glycerides of stearic, palmitic and oleic acids. Complies with tests for absence of wax, stearin and tallow.
Yugoslavia, Bulgaria, Greece, Turkey, Persia, India and Russia	Morphine (12 to 21%), narcotine, codeine, thebaine, narceine, and papaverine. Meconic acid. Contains, in its moist condition, as imported, not less than 9.5% of morphine, calculated as anhydrous morphine.
United States of America, Canada, Sweden, and Central Europe	Benzene, toluene, xylene, styrolene, phenol, cresol, guaiacol and its homologues, pyrocatechin and paraffin.
Eastern United States and Canada	Podophyllotoxin (0.2 to 1.0%), podophylloresin and picropodophyllin. Contains not more than 2% of other organic matter.

Name of Drug	Brief Definition	Natural Origin and Family
Podophyllum Indicum	Dried rhizome and roots	<i>Podophyllum emodi</i> . Berberidaceæ.
Prunus Serotina	Bark collected in the autumn	<i>Prunus serotina</i> . Rosaceæ.
Quassia	Stem-wood	<i>Picrara excelsa</i> . Simarubaceæ.
Quillaja	Dried inner part of the bark	<i>Quillaja Saponaria</i> and other species of <i>Quil-</i> <i>laja</i> . Rosaceæ.
Rheum	Rhizome cultivated in China and Tibet, deprived of most of its bark, and dried	<i>Rheum palmatum</i> and possibly other species of <i>Rheum</i> . Polygonaceæ.
Sabina	Fresh or dried young shoots	<i>Juniperus Sabina</i> . Pinaceæ.
Scilla	Bulbs divested of their dry membranous outer scales, cut into slices, and dried	<i>Urginea Scilla</i> . Liliaceæ.
Senega	Dried root	<i>Polygala Senega</i> . Polygalaceæ.
Sennæ Folium (Alexandrian)	Dried leaflets	<i>Cassia acutifolia</i> . Leguminosæ.
Sennæ Folium (Tinnevely)	Dried leaflets	<i>Cassia angustifolia</i> . Leguminosæ.
Sennæ Fructus (Alexandrian)	Dried ripe fruits	<i>Cassia acutifolia</i> . Leguminosæ.
Sennæ Fructus (Tinnevely)	Dried ripe fruits	<i>Cassia angustifolia</i> . Leguminosæ.
Serpentaria	Dried rhizome and roots	<i>Aristolochia reticulata</i> . Aristolochiaceæ.
Sevum	Purified internal fat of the abdomen	<i>Ovis aries</i> . Ungulata.
Stramonium	Dried leaves and flowering tops	<i>Datura Stramonium</i> and <i>D. tatula</i> . Solanaceæ.
Strophanthus	Dried ripe seeds freed from awns	<i>Strophanthus kombé</i> . Apocynaceæ.

Geographical Source	Chief Constituents and Pharmacopœcial Requirements
Himalayas	Podophyllotoxin (1 to 4%), podophylloresin. Contains not more than 2% of other organic matter.
North America, especially the northern and central States	Prunasin, prunase and a resin. Contains not more than 2% of other organic matter.
Jamaica	α - and β -picrasmin. Contains not more than 2% of other organic matter.
Chili and Peru	Quillaic acid, quillaia-sapotoxin and sucrose. Contains not more than 2% of other organic matter. Ash, not more than 15%.
China and Tibet	Gallic acid, tannin, amorphous non-glycosidic resin, rhein, emodin, aloe-emodin, emodin monomethyl ether, chrysophanic acid, glycosides and rheinolic acid. Contains not more than 2% of other organic matter. Ash, not more than 15%; alcohol (45%)-soluble extractive, not less than 35%.
England and Southern Europe	Volatile oil (2 to 4%), tannin and resin.
Mediterranean regions	Scillipicrin, scillitoxin, scillain, scillinin, scillamarin and scillitin. Ash, not more than 6%.
Southern Canada and the United States of America	Senegin, polygalic acid and fixed oil. Contains not more than 5% of stems and other organic matter.
Regions of the Middle and Upper Nile	Rhein, aloe-emodin, kempferol and isorhamnetin. Mucilage. Contains not more than 1% of stalks, and not more than 2% of other organic matter. Ash, not more than 12%; acid-insoluble ash, not more than 3%.
Southern India	Rhein, aloe-emodin, kempferol and isorhamnetin. Mucilage. Contains not more than 1% of stalks, and not more than 2% of other organic matter. Ash, not more than 12%; acid-insoluble ash, not more than 3%.
Regions of the Middle and Upper Nile	Constituents are similar to those of Sennæ Folium. Contains not more than 2% of other organic matter.
Southern India	Constituents are similar to those of Sennæ Folium. Contains not more than 2% of other organic matter.
United States, collected mainly in Texas	Volatile oil (about 1%), tannin and a bitter principle. Contains not more than 10% of its subaerial stems, and not more than 2% of other organic matter. Ash, not more than 10%.
Domesticated everywhere	Glycerides of stearic and palmitic acids about 70 to 80% and 20 to 30% of the glyceride of oleic acid.
England, Germany; Hungary and United States of America	Hyoscyamine with small quantities of atropine and hyoscyne (total alkaloids = 0.3 to 0.5%). Contains not more than 2% of other organic matter, not more than 20% of its stem, not more than 1% of its stem having a width greater than 4 mm., and not less than 0.25% of the alkaloids of stramonium, calculated as hyoscyamine. Ash, not more than 20%; acid-insoluble ash, not more than 4%.
Eastern Tropical Africa.	Strophanthin (mixture of glycosides), fixed oil, komic and strophanthic acids. Contains not more than 2% of other organic matter. Sulphuric acid, diluted with one-third of its volume of water, colours the endosperm, and sometimes the cotyledons, deep green. Ash, not more than 5%.

Name of Drug	Brief Definition	Natural Origin and Family
Styrax	A balsam obtained from the wounded trunk, purified by solution in alcohol, filtration, and subsequent evaporation of the solvent	<i>Liquidamber orientalis</i> . Hamamelidaceæ.
Tamarindus	Fruits freed from the brittle outer part of the pericarp, and preserved with sugar	<i>Tamarindus indica</i> . Leguminosæ.
Thyroideum	Dried, powdered and defatted glands	<i>Bos taurus</i> and <i>Ovis aries</i> . Bovidæ. <i>Sus scrofa</i> . Suidæ.
Tragacantha	Dried gummy exudation obtained by incision from the bark	<i>Astragalus gummifer</i> and some other species of <i>Astragalus</i> . Leguminosæ.
Urginea	Bulbs divested of their dry membranous outer scales, cut into slices and dried	<i>Urginea indica</i> . Liliacæ.
Valeriana	Rhizome and roots collected in the autumn and dried	<i>Valeriana officinalis</i> . Valerianacæ.
Valeriana Indica	Dried rhizome and roots	<i>Valeriana Wallichii</i> . Valerianacæ.
Zingiber	The rhizome scraped to remove the dark outer skin and dried in the sun	<i>Zingiber officinale</i> . Zingiberacæ.

Geographical Source	Chief Constituents and Pharmacopœial Requirements
Asiatic Turkey	A resin consisting of free storesinol and storesinol combined with cinnamic acid; and an oily liquid consisting of styrol, cinnamic acid (free and combined to form esters) and vanillin. Contains not less than 30% of total balsamic acids, calculated with reference to the substance dried on a water-bath for 1 hour. Loses, when heated in a thin layer on a water-bath for 1 hour, not more than 5% of its weight.
Africa, India, and the West Indies	Tartaric acid, potassium acid tartrate and invert sugar (cane sugar is used as a preservative). Yields no reactions characteristic of copper.
Domesticated everywhere.	Thyroxine.
Greece, the Turkish Empire and Iran	Polyarabinantrigalactangeddic acid, α - and β -tragacanthanxylanbassoric acids. Contains not more than 2% of other organic matter. When powdered it does not acquire a pink colour in solution of ruthenium red. Ash, not more than 4%.
India	Bitter principles similar to the glycosidal substances, found in squill and mucilage. Contains not more than 6% of ash.
England, Holland, Germany and Belgium	Volatile oil (about 1%), chatinine and valerianine. Contains not more than 5% of other organic matter. Ash, not more than 10%.
Northern India	Volatile oil (about 1%). Contains not more than 2% of other organic matter and not more than 12% of ash.
West Indies, India, Africa and Japan	Volatile oil (1 to 3%) and gingerol. Alcohol (90%) -soluble extractive, not less than 4.5%, water-soluble extract, not less than 10%; ash, not more than 6%; water-soluble ash, not less than 1.7%.

DICTIONARY OF SYNONYMS AND TRADE NAMES

Though certain names which are registered as trade-marks are included in this list (as indicated by an asterisk), it should be noted that it is an actionable infringement to treat them as synonyms in practice, as an action for damages may arise out of the substitution of an identical preparation made by another maker, where a trade-mark description has been used. Occasionally prescribers attach wrong makers' initials to a trade-mark; it is wiser in such cases to ignore the initials, since a trade-mark is a property enjoying specific legal protection, whereas the use of initials to indicate a maker is merely a custom.

A.B.C. LINIMENT.....	Linimentum Aconiti Oleosum, B.P.C.
A.B.C. Powder.....	Boric Acid, Bismuth Subnitrate, Calomel, in equal parts.
A.C.E.....	Dehydrated Alcohol 1, Chloroform 2, Ether 3.
Abercrombie's Cough Mixture	Syrup of Squill 20, Tincture of Opium 3-33, Cinnamon Water 40, Water to 100.
Abernethy's Mixture.....	Mistura Sennæ Composita (<i>approx.</i>).
Abernethy's Pills	Pilulæ Colocynthis et Hydrargyri, B.P.C.
Abyssinian Tea	Catha.
Accumulator Acid	Dilutions of Sulphuric Acid.
Acetarson	Acetarsol.
Acetic Ether	Ethyl Acetate.
Acetomorphine.....	Diamorphine.
Acetosalic Acid.....	Acetylsalicylic Acid.
Acetosalin	Acetylsalicylic Acid.
Acetparaphenalide	Phenacetin.
Acetphenetidin.....	Phenacetin.
Acetum	Malt Vinegar.
Acetum Epispasticum	Vinegar of Cantharides.
Acetum Opii	Opium 10, Nutmeg 3, Sucrose 20, Diluted Acetic Acid to 100.
Acetum Plumbi	Strong Solution of Lead Subacetate.
Acetum Rubi Idæi.....	Raspberry Vinegar.
Acetum Saturni	Strong Solution of Lead Subacetate.
Acetylene Dichloride	Dichlorethylene.
Acetylene Tetrachloride	Tetrachlorethane.
Acetylphenetidin	Phenacetin.
Acetyltannic Acid	Acetannin.
Acid Aminic.....	Formic Acid.

Acid Bath	Diluted Nitro-hydrochloric Acid 1, Water 320.
Acid Bismuth Sodium Tartrate	Bismuthi et Sodii Tartras Acidus, B.P.C.
Acid Calcium Phosphate.....	Monobasic Calcium Phosphate.
Acid Carbonate	Bicarbonate.
Acid Elixir of Vitriol.....	Acid. Sulph. Aromat., B.P.C.
Acid Quinine Hydrochloride..	Quinine Dihydrochloride.
Acid of Sugar	Oxalic Acid.
Acid Vitriolated Tartar.....	Potassium Bisulphate.
Acid Whey.....	Cow's Milk deprived of Cream, boiled with a little Cream of Tartar, and coagulated with Vinegar or Lemon Juice.
Acido Agalico	Gallic Acid.
Acido Timico	Thymol.
Acidum Acetosalicum	Acetylsalicylic Acid.
Acidum Arseniosum	Arsenic Trioxide.
Acidum Borussicum	Hydrocyanic Acid.
Acidum Carbazoticum	Trinitrophenol.
Acidum Chloro-hydrargyricum	Mercuric Chloride.
Acidum Chloronitrosium	Nitrohydrochloric Acid.
Acidum Chromicum	Chromium Trioxide.
Acidum Cresylicum	Cresol.
Acidum Hydrobromicum,	
Fothergill.	Diluted Hydrobromic Acid (<i>approx.</i>)
Acidum Hydrosulphuricum ..	Sulphuretted Hydrogen.
Acidum Metaphosphoricum..	Glacial Phosphoric Acid.
Acidum Muriaticum	Impure Hydrochloric Acid.
Acidum Phenicum	Phenol.
Acidum Phenylicum	Phenol.
Acidum Picricum	Trinitrophenol.
Acidum Pyrolignosum	Impure Acetic Acid.
Acidum Sacchari	Oxalic Acid.
Acidum Salaceticum	Acetylsalicylic Acid.
Acidum Scytodephicum	Tannic Acid.
Acidum Vitriolicum	Sulphuric Acid.
Acor Aceticus	Glacial Acetic Acid.
Acrosyl*	Liq. Cresol. Sap., B.P.
Actæa Racemosa Radix.....	Cimicifuga.
Adalin*	Carbromal.
Adder Oil	See Oil of Vipers.
Addison's Pill	Pil. Digitalis Compositæ, B.P.C.
Adeps Anseris	Goose-grease.
Adeps Myristicæ	Expressed* Oil of Nutmeg.
Adeps Ovillus	Prepared Suet.
Adeps Preparatus	Prepared Lard.
Adeps Suillus	Lard.
Adhesive Plaster	Emplastrum Colophonii, B.P.
Adnephryn*	Adrenaline.
Adrenaline Inhalant	Neb. Adrenal. Aromat., B.P.C.
Adrenine	Adrenaline.
Ærugo	Basic Copper Subacetate.

Ærugo Crystallisata	Copper Subacetate in crystalline masses.
Æs Viride	Copper Subacetate.
Æthanoli Chloridum	Ethyl Chloride.
Æther Aceticus	Ethyl Acetate.
Æther Muriaticus	Ethyl Chloride.
Æther Purificatus	Anæsthetic Ether.
Æther Sulphuricus	Ether.
Æthiops Absorbens	Grey Powder.
Æthiops Martialis	Magnetic Iron Oxide.
Æthiops Vegetabilis	Residue left on incinerating <i>Fucus vesiculosus</i> in a closed vessel.
African Pepper	Capsicum.
Agaricin	Agaric Acid.
Agotan*	Cinchophen.
Ague Root	Aletris.
Airoform	Bismuth Oxyiodogallate.
Airogen	Bismuth Oxyiodogallate.
Airol*	Bismuth Iodogallate.
Aker-tuba	Derris.
Albargin*	Silver Gelatose.
Albucid*	Sulphacetamide.
Alcohol Sulphuris	Carbon Disulphide.
Alder Buckthorn Bark	Frangula.
Aleppo Galls	Gall.
Algaroth's Powder	Mixture of Antimony Oxychloride and Antimony Oxide.
Alibour Water	Lotio Cupro-Zincica.
Alkalised Mercury	Grey Powder.
Alkanet Root	Anchusa.
Alkanna	Anchusa.
Allodene*	Amphetamine.
Allspice	Pimento.
Allyl-Sulphocarbamide	Thiosinamine.
Allylthiocarbamide	Thiosinamine.
Allylthiourea	Thiosinamine.
Alocol*	Colloidal Aluminium Hydroxide.
Alopon*	Papaveretum.
Althein	Asparagin.
Alum Root	Root of <i>Geranium maculatum</i> .
Alumen Romanum	Roche Alum (<i>q.v.</i>).
Alumen Rubrum	Roche Alum (<i>q.v.</i>).
Alumen Ustum	Alum heated above 200° to form an insoluble oxysulphate.
Aluminium Trisulphate	Aluminium Sulphate.
Alunite	Potash Alum.
Amber Resin	Colophony.
Amblygonite	Natural fluophosphate of Aluminium and Lithium.
American Ashes	Crude Potassium Carbonate.
American Copal	From <i>Hymenæa Courbaril</i> .
American Elder	<i>Sambucus canadensis</i> .
American Hellebore	Green Hellebore.

American Mandrake	Podophyllum.
American Olibanum	Oleoresin from <i>Juniperus phœnicea</i> .
American Pennyroyal	<i>Hedeoma pulegioides</i> .
American Senna	<i>Cassia marilandica</i> .
American Turpentine	Oil of Turpentine.
American Veratrum	Green Hellebore.
American Wormseed	Chenopodium.
Ametox*	Preparations of Calcium, Magnesium or Sodium Thiosulphate.
Amidofebrin	Amidopyrin.
Aminic Acid	Formic Acid.
Aminoacetic Acid	Glycine.
Amino-arseno-phenol	Arsphenamine.
Aminobenz	Orthocaine.
Aminoform	Hexamine.
Amino-Glaucosan*	10 per cent. solution of Histamine Hydrochloride.
Aminophylline	Theophylline with Ethylenediamine.
Aminopyrina	Amidopyrine.
Aminosuccinamic Acid	Asparagin.
Ammonaldehyde	Hexamine.
Ammoniæ Hydriodas	Ammonium Iodide.
Ammoniæ Hydrochloras	Ammonium Chloride.
Ammoniæ Murias	Ammonium Chloride.
Ammoniæ Sesquicarbonas ...	Ammonium Carbonate.
Ammoniated Citro-arsenite of Iron	Iron and Ammonium Citro-arsenite.
Ammonio-ferric Alum.	Iron Alum.
Ammonio-formaldehyde	Hexamine.
Ammonio-mercuric Chloride ..	Ammoniated Mercury.
Ammonium Hydricum Solutum	Liq. Ammon. Dil., B.P.
Ammonium Hydrosulphide ..	Ammonium Sulphide.
Ammonium Ichthosulphonate ..	Ichthammol.
Ammonium Ichthosulphonate Jelly	Pasta Ichthammolis, B.P.C.
Ammonium Sulphoichthyolate ..	Ichthammol.
Ammonium Sulphydrate	Ammonium Sulphide.
Amniotin*	Estro-ne preparations.
Amosite	Variety of Asbestos.
Amphotropin*	Hexamine Camphorate.
Amylase	Diatase.
Amytal*	isoAmylethylbarbituric Acid.
Anacardone*	Nikethamide.*
Anæsthesin*	Benzocaine.
Analgesic Balsam	Ung. Methyl. Salicyl. Co., B.P.C.
Analgesine	Phenazone.
Anarcotine	Narcotine.
Anatoxin	Diphtheria Toxoid.
Andalusite	Aluminium Silicate.
Andeer's Lotion	Resorcinol 40 grains, Water 1 oz.
Andrew Clark's Liver Pills...	Pil. Aloin. Co., B.P.C.

Androstin*	Total Testicular Extract.
Anestile*	Mixture of Methyl and Ethyl Chlorides.
Aneurin	Aneurine Hydrochloride.
Aneurine Hydrochloride	Vitamin B ₁ .
Angostura Bark	Cusparia.
Anhydrite	Anhydrous Calcium Sulphate.
Anhydro-glucochloral	Glucochloral.
Aniline Brown	Bismarck Brown.
Aniline Oil	Aniline.
Aniline Red	Magenta.
Anilosulphonic Acid	Sulphanilic Acid.
Animal Oil	Bone Oil.
Animirtin	Cocculin.
Annatto Seed	Bixa.
Anodyne Balsam	Liniment of Opium.
Anodyne Drops	Hoffmann's Anodyne.
Anodyne Liniment.	Liniment of Opium.
Anthralin*	Dithranol.
Anti-catarrhal Salts	Vap. Eucalypt. Co., B.P.C.
Anticomana*	Decamethylene-diguanide Bitartrate.
Antifebrin	Acetanilide.
Antilusin*	Preparations of Normal Horse Serum.
Antimonii Oxysulphuret.	Sulphurated Antimony.
Antimonii Potassio-tart.	Potassium Antimonyltartrate.
Antimonii Sulph. Aureum	Sulphurated Antimony.
Antimonii Sulph. Præcip.	Sulphurated Antimony.
Antimonium Crudum	Black Antimony.
Antimonium Tartaratum	Potassium Antimonyltartrate.
Antimony Trioxide	Antimonious Oxide.
Antipyrin.	Phenazone.
Antiseptic Corrosive Sublimate Tablets	Solv. Hydrarg. Perchlor., B.P.C.
Antiseptic Ethereal Soap	Liquor Saponis Antisepticus, B.P.C.
Antiseptic Perchloride Tablets	Solv. Hydrarg. Perchlor., B.P.C.
Antiseptic Powder, Soluble	Pulv. Zinc. Sulph. Co., B.P.C.
Antiseptic Solution	Liquor Thymol Co., B.P.C.
Antiseptic Solution, Surgical	Liq. Chloroxyleneol, B.P.C.
Antivariolus Vaccine	Vaccine Lymph.
Antivenene	Anti-venom Serum.
Antostab*	Gonadotrophic factor from serum of pregnant mares.
Antoxylin "S"*	Solution of gonadotrophic factor from pregnancy urine.
Antuitrin*	Pituitary (Anterior Lobe) Extract.
Antuitrin "Growth"*	Growth hormone from anterior pituitary.
Antuitrin "S"*	Solution of gonadotrophic factor from pregnancy urine.
Apatite	Natural Calcium Phosphate.
Apozem	A decoction.
Aqua Aluminosa	Alum and Zinc Sulphates, each 1; Water 80.

Aqua Ammoniaë	Strong Solution of Ammonia 1, Dis- tilled Water 2.
Aqua Ammoniaë Acetatis	Dilute Solution of Ammonium Acetate.
Aqua Anthos	Rosemary Water.
Aqua Chlori	Liquor Chlori, B.P.C.
Aqua Coloniensis	Spiritus Coloniensis, B.P.C.
Aqua Dulcis	Chloroform Water.
Aqua Fontana	Tap Water, Spring Water.
Aqua Fortis	Strong Impure Nitric Acid.
Aqua Hydrogenii Dioxidii	Solution of Hydrogen Peroxide.
Aqua Kali Puri	Solution of Potassium Hydroxide.
Aqua Lactucæ	Flowering Lettuce 1, Water 2. Distil half.
Aqua Lavandulæ	Sp. Lavand. Co., B.P.C.
Aqua Lithargyri Acetati	Strong Solution of Lead Subacetate.
Aqua Lithiæ	Effervescent Solution of Lithium Carbonate.
Aqua Menthaë Sativæ	Spearmint Water.
Aqua Menthaë Vulgaris	Spearmint Water.
Aqua Naphæ	Orange-flower Water.
Aqua Phagedænica	Yellow Mercurial Lotion.
Aqua Phagedænica Mitis	Black Mercurial Lotion.
Aqua Plumbi	Dilute Solution of Lead Subacetate.
Aqua Potassæ Effervescens...	Effervescent Solution of Potassium Bicarbonate.
Aqua Rabelli	Alcohol 3, Sulphuric Acid 1, by weight.
Aqua Raphani Co.	Compound Spirit of Horseradish.
Aqua Regia	Nitric Acid 3, Hydrochloric Acid 4.
Aqua Saturni	Dilute Solution of Lead Subacetate.
Aqua Sedativa	Spirit of Camphor (10 per cent.) 10, Solution of Ammonia 60, Sodium Chloride 60, Distilled Water 1000.
Aqua Tiliæ	Lime Flower Water.
Aqua Vegeto-mineralis Goulardi	Dilute Solution of Lead Subacetate.
Aqua Vitæ	Brandy.
Aquila Alba	Calomel.
Arabian Tea	Catha.
Araroba Depurata	Chrysarobin.
Arcanum Duplicatum	Potassium Sulphate.
Archil	Orchil.
Argem.*	Silver Proteinate.
Argenti Nucleinas	Mild Silver Proteinate.
Argenti Vitellin	Mild Silver Proteinate.
Argento-Proteinum Forte	Silver Proteinate.
Argento-Proteinum Mite	Mild Silver Proteinate.
Argentum Créde	Colloidal Silver.
Argentum Vivum	Mercury.
Argol	Crude Cream of Tartar.
Argyrol*	Mild Silver Proteinate.
Armel	Harmal.
Armenian Bole	Native Ferric Oxide.

Arnica Opodeldoc	Linimentum Arnicae, B.P.C.
Arnicae Radix	Arnica Rhizome.
Arnotta	Annatto.
Aromatic Cascara	Elixir of Cascara Sagrada.
Aromatic Syrup of Figs	Syrupus Ficorum Compositus, B.P.C.
Aromatic Vinegar	Acidum Aceticum Aromaticum, B.P.C.
Arsenious Acid	Arsenic Trioxide.
Arsenious Anhydride	Arsenic Trioxide.
Arsenious Iodide	Arsenic Triiodide.
Arsenious Oxide	Arsenic Trioxide.
Arsenious Wool	Dental Arsenical Fibre.
Arsenobenzene	Arsphenamine.
Arsenobenzol	Arsphenamine.
Arsenobillon*	Arsphenamine.
Arsenophenol-amine	Arsphenamine.
Arvitin*	Mild Silver Proteinat.
Asaprol	Calcium β -Naphtholsulphonate.
Ascorbic Acid	Vitamin C.
Aspidium	Male Fern.
Aspidosperma	Quebracho.
Atebrin*	Mepacrine Hydrochloride.
Atis Root	<i>Aconitum heterophyllum</i> .
Atophan*	Cinchophen.
Atoquinol*	Allyl Phenylcinchoninate.
Atramentum Heberdenii	Aromatic Mixture of Iron.
Atramentum Nigrum	Black Ink.
Attar	Otto.
Aurantii Amara Cortex	Dried Bitter-Orange Peel.
Aurantii Cortex Indicus	Indian Orange Peel.
Aurobin*	Gold Sodium Thiosulphate.
Australian Copal	Fossil resin obtained from <i>Agathis Australis</i> .
Australian Fever Bark	Alstonia.
Australian Snake Weed	Euphorbia.
Avantine*	Isopropyl Alcohol.
Avena Decorticata	Groats.
Avenae Farina	Oatmeal.
Avenae Semina	Oats.
Avertin*	Bromethol.
Avoleum*	Vitamin A concentrate.
Awa Root	Kava.
Axunge or Axungia	Lard.
Azadirach, Indian	Neem or Margosa Bark.
Azotite d'Amyle	Amyl Nitrite.
Azur-Eosin Solution	Giemsa's Stain.
B.C.G. VACCINE	Oral tuberculosis immunising vaccine.
B.E.	Vaccinum Tuberculinum, B.P.C.
B.I.P.P.	Pasta Bismuthi et Iodoformi, B.P.C.
B.O.V.	Impure Sulphuric Acid (Brown Oil of Vitriol).

Babul Bark	Acacia Bark.
Baillie's Pills	Pil. Digitalis Compositæ, B.P.C.
Baird's Pills	1½ gr. each of Aloes, Scammony, and Extract of Hyoscyamus, and ¼ gr. of Ipecacuanha.
Balm Drops	Friars' Balsam.
Balm of Gilead	Oleoresin of <i>Balsamodendron</i> species.
Balsam of Copaiba	Copaiba.
Balsam of Fern	Liquid Extract of Male Fern.
Balsam of Fir	Canada Balsam.
Balsam of Life	Compound Decoction of Aloes.
Balsam of Soap	Soap Liniment.
Balsam of Storax	Prepared Storax.
Balsam of Sulphur	Sulphur 1, Olive Oil 4 or 9 (heated together till they combine).
Balsamum Commendatoris	Compound Tincture of Benzoin.
Balsamum Dipterocarpi	Gurjun Oil.
Balsamum Filicis	Liquid Extract of Male Fern.
Balsamum Styracis	Prepared Storax.
Balsamum Terebinthinæ	Dutch Drops.
Balsamum Traumaticum	Compound Tincture of Benzoin.
Balsamum Universale	Camphor 1, Lead Acetate 6, Beeswax 16, Rape Oil 48.
Banilloes	Vanilla Pods.
Barbados Tar	Bitumen or Mineral Tar.
Barbital	Barbitone.
Barbul or Barbura Bark	Acacia Bark.
Barium Meal	Pulv. Barii Sulphatis Co., B.P.C.
Barium Sulphide	Sulphurated Baryta.
Barker's Solution	Amylocaine Hydrochloride 0·1 g., Dextrose 0·1 g., Water to 2 ml.
Barm	Liquid Brewers' Yeast.
Baryta	Barium Oxide.
Barytes	Barium Sulphate.
Basham's Mixture	Solution of Ferric Chloride 15 m., Solution of Ammonium Acetate 2 dr., Dilute Acetic Acid 15 m., Glycerin 15 m., Water to ½ oz.
Basic Fuchsine	Magenta.
Basilicon Ointment, Yellow	Ung. Colophonii, B.P.C.
Bassora Gum	Hog Gum.
Bassorin Paste	A Tragacanth Paste.
Bath Mustard	Powdered Mustard from which the seed coats have not been completely removed.
Baume de Vie	Compound Decoction of Aloes.
Bauxite	Natural Aluminium Hydroxide.
Bay Berries	Fruit of <i>Laurus nobilis</i> .
Bay, English	<i>Laurus nobilis</i> .
Bay Laurel	<i>Mercia acris</i> .
Bay Rum	Compound Spirit of Bay.
Bay Salt	Sea Salt.

Bay, Sweet (<i>Am.</i>)	<i>Magnolia virginiana</i> or <i>Pimenta acris</i> .
Bay, Sweet (<i>Eng.</i>)	<i>Laurus nobilis</i> .
Bayberry	Dried root-bark of <i>Myrica cerifera</i> .
Bayer "205"*	Suramin.
Baylahuen	Damiana.
Bayliss Solution	Gum Acacia 6 or 7 per cent. in Normal Saline Solution.
Beaume de Mecca	Balm of Gilead.
Bebeerine Sulphate	Berberine Sulphate.
Bebeeru Bark	Bark of <i>Nectandra Rodiæi</i> .
Beck's Bismuth Paste	Injection of Bismuth Subnitrate (see B.P.C.).
Befortiss*	Aneurine Hydrochloride.
Benerva*	Aneurine Hydrochloride.
Bengal Kino	Butea Gum.
Bengal Quince	Bael.
Benguin's Sulphuretted Spirit	Ammonium Sulphide.
Benjamin	Benzoin.
Benné Oil	Sesame Oil.
Benzaldehyde Green	Malachite Green.
Benzamino-acetic Acid	Hippuric Acid.
Benzedrine*	Amphetamine.
Benzine	Petroleum Benzine.
Benzine (Fr. Cx.)	Benzene.
Benzo-Gynestrol*	Estradiol Benzoate.
Benzol	A mixture of Benzene and homologues.
Benzoline	Petroleum Benzine.
Benzonaphthol	Betanaphthyl Benzoate.
Benzophenol	Phenol.
Benzophenone	Diphenylketone.
Benzosulphinidum	Saccharin.
Benzoyl Hydrate	Benzoic Acid.
Benzoyl-glycocol	Hippuric Acid.
Benzoyl-Naphthol	Betanaphthyl Benzoate.
Benzoylpseudotropine Hydrochloride	Tropacocaine Hydrochloride.
Beprochin	Pamaquin.
Berberinium Acid Sulphate	Berberine Sulphate.
Berin*	Aneurine Hydrochloride.
Berlin Blue	Prussian Blue.
Berthollet's Neutral Carbonate of Ammonia	Ammonium Bicarbonate.
Bertoni's Ether	Tertiary Amyl Nitrite.
Betabion*	Aneurine Hydrochloride.
Beta-Borocaine*	Benzamine Borate.
Betacaine Hydrochloride	Benzamine Hydrochloride.
Betacaine Lactate	Benzamine Lactate.
Beta-eucaine Hydrochloride*	Benzamine Hydrochloride.
Betalin*	Aneurine Hydrochloride.
Betaxan*	Aneurine Hydrochloride.
Betel	Leaves of <i>Piper Betle</i> .
Betel Nuts	Areca.

Betol	Naphthol Salicylate.
Biarsamide*	Bismuth Tryparsamide.
Bibiru Bark	Bebeeru Bark.
Biborate of Soda	Borax.
Biebrich Scarlet R. Medicinal	Scarlet Red.
Bikh	Indian Aconite.
Bile Salts	Sodium Tauroglycocholate.
Bilivaccines*	Vaccines for oral administration.
Billroth's Cambric	A specially prepared cotton fabric.
Birch Tar	Birch Tar Oil.
Birch Tar Oil	Oil from Wood of <i>Betula alba</i> .
Bird Pepper	Capsicum devoid of pungency.
Bisglucol*	Injection of Precipitated Bismuth.
Bish	Indian Aconite.
Bismostab*	Injection of Precipitated Bismuth.
Bismuth Betanaphtholate	Bismuth Naphtholate.
Bismuth Carbolate	Bismuth Phenate.
Bismuth Oxybenzoate	Bismuth Benzoate.
Bismuth Oxycarbonate	Bismuth Carbonate.
Bismuth Oxychloride	Bismuth Subchloride.
Bismuth Oxygallate	Bismuth Subgallate.
Bismuth Oxyhydrate	Bismuth Hydroxide.
Bismuth Oxyiodosubgallate ..	Bismuth Oxyiodogallate.
Bismuth Oxynitrate	Bismuth Subnitrate.
Bismuth Oxysalicylate	Bismuth Salicylate.
Bismuth Phenolate	Bismuth Phenate.
Bismuth and Soda Mixture ..	Mist. Bism. et Sod. Bicar., B.P.C.
Bismuth Subcarbonate	Bismuth Carbonate.
Bismuth Subiodide	Bismuth Oxyiodide.
Bismuth Subsalicylate	Bismuth Salicylate.
Bismuthum Album	Bismuth Subnitrate.
Bismuthyl Iodide	Bismuth Oxyiodide.
Bismutum Bitannicum	Bismuth Tannate.
Bissy Nuts	Kola Seeds.
Bisulphate of Potash	Potassium Acid Sulphate.
Bitartrate of Potash	Potassium Acid Tartrate.
Bitter Apple	Colocynth.
Bitter Wood	Quassia.
Bittersweet, False (<i>Am.</i>)	<i>Celastrus scandens</i> .
Bittersweet, False (<i>Eng.</i>)	<i>Solanum Dulcamara</i> .
Black Antimony	Black Antimony Sulphide.
Black Bryony	Fresh root of <i>Tamus communis</i> .
Black Chebulic Myrobalans ..	Myrobalans.
Black Cohosh	Cimicifuga.
Black Draught	Mist. Sennæ Co., B.P.
Black Drop	Acetum Opii.
Black Elder	Hemp Agrimony (<i>Eupatorium cannabinum</i> Linn.)
Black Jam	Confection of Senna.
Black Lead	Graphite.
Black Magnesia	Manganese Dioxide.
Black Mustard Oil	Expressed Oil of Mustard.

Black Oxide of Iron	Magnetic Iron Oxide.
Black Oxide of Mercury	Mercurous Oxide.
Black Root	Leptandra.
Black Sassafras	Oliver's Bark.
Black Snakeroot	Cimicifuga.
Black Sugar	Liquorice Extract in Sticks.
Black Sulphur	Impure Native Sulphur.
Black Wash	Lotio Hydrargyri Nigra, B.P.
Bladderwrack	Fucus.
Blanc de Baleine	Spermaceti.
Blanc d'Espagne	Bismuth Oxychloride.
Blanc de Fard	Bismuth Oxychloride.
Blanc de Perle	Bismuth Oxychloride.
Blaud's Pill	Pilula Ferri Carbonatis, B.P.
Blaud's Tablets	Tab. Ferri Carbonatis, B.P.C.
Bleaching Liquid	Solution of Chlorinated Lime.
Bleaching Powder	Chlorinated Lime.
Blistering Beetle	Cantharides.
Blistering Liquid	Liquor Epispasticus, B.P.
Blistering Plaster	Emplastrum Cantharidini, B.P.
Block Juice	Commercial Extract of Liquorice.
Blood Root	Sanguinaria.
Blue Butter	Unguentum Mercuriale, B.P.C.
Blue Cohosh	Caulophyllum.
Blue Copperas	Crude Copper Sulphate.
Blue Flag	Iris.
Blue Galls	Gall.
Blue Gauze	Sal Alembroth Gauze.
Blue Lint	Sal Alembroth Lint.
Blue Mass	Pilula Hydrargyri, B.P.
Blue Ointment	Unguentum Mercuriale, B.P.C.
Blue Paint	Liquor Tinctorium, B.P.C.
Blue Pill	Pilula Hydrargyri, B.P.
Blue Stone	Crude Copper Sulphate.
Blue Vitriol	Crude Copper Sulphate.
Blue Wool	Sal Alembroth Wool.
Bog Moss	Sphagnum.
Bogbean Leaf	<i>Menyanthes Trifoliata</i> .
Boiled Oil	Linseed Oil boiled with Litharge.
Bol Blanc	Kaolin.
Bole, Armenian	Native Ferric Oxide.
Boletus Laricis	Agaric.
Bolus Alba	Kaolin.
Bonain's Solution	Phenol, Menthol and Cocaine Hydrochloride, equal parts.
Bone Ash	Ash obtained by heating bones in air.
Bone Black	Crude Animal Charcoal.
Bone Earth	Bone Ash.
Bone Oil	Oil distilled from Bones.
Bone Wax*	Cera Aseptica, B.P.C.
Boneset	Eupatorium.

Bonney and Browning's Solution.....	Liquor Tinctorium, B.P.C.
Borate of Soda	Borax.
Bordeaux B.	Azorubrum, B.P.C.
Bordet-Gengou Bacillus Vaccine	Whooping Cough Vaccine.
Borneo Camphor	Borneol.
Bornyl Alcohol.....	Borneol.
Borocaine*	Procaine Borate.
Bottle Bacillus	Former synonym for Acne Bacillus.
Boyle's Furning Liquor.....	Ammonium Sulphide.
Brandish's Solution	Impure Solution of Potash.
Brass Paste	Basic Copper Sulphate 86, with Basic Zinc Sulphate 14.
Brazil Wax	Carnauba Wax.
Brazil Wood	Wood of <i>Cesalpinia tinctoria</i> and other species.
Brazilian Cocoa	Guarana.
Bresille Wood.....	Red Sanders Wood.
Brimstone	Sublimed Sulphur.
British Gum.....	Dextrin.
Britt*	Saccharin.
Brodie's Gout Pills	Pil. Colch. et Hydrarg. Co., B.P.C.
Bromol.....	Tribromophenol.
Bromphenobis	Bismuth Tribromphenate.
Bromphenol Bismuth	Bismuth Tribromphenate.
Brompton Cough Lozenges ..	Trochisci Glycyrrhizæ, B.P.C.
Broom Tops.....	Scoparium.
Bromural*	Bromoisovalerianylurea.
Brown Hydrated Oxide of Iron	Brown Precipitated Ferric Oxide.
Brown Soap Plaster.....	Soap Plaster.
Browning.....	Burnt Sugar.
Brucite.....	Natural Magnesium Hydroxide.
Bryone Noir	Jalap.
Burdock Root.....	Lappa.
Burgundy Pitch	Resin from <i>Picea excelsa</i> .
Burn Dressings	Standard Dressings Nos. 11 and 12.
Burnett's Disinfecting Fluid..	Solution of Zinc Chloride.
Burnt Alum	Alum heated above 200° to form an insoluble oxy-sulphate.
Burow's Solution.....	Liquor Aluminii Acetatis, B.P.C.
Busserole.....	Uva Ursi.
Butanol	n-Butyl Alcohol.
Butea Gum.....	Kino from <i>Butea frondosa</i> .
Butolan*	Diphenan.
Butter of Antimony.....	Solution of Antimonious Chloride.
Butter of Zinc.....	Zinc Chloride.
Buxine Sulphate.....	Beberine Sulphate.
Byne or Bynes	Malt.

C.E.....	Chloroform 2, Ether 3.
C.O.V.....	Impure Sulphuric Acid (Commercial Oil of Vitriol).
Cabardine Musk.....	Inferior Musk from Siberia and N. China.
Cabbage Oil.....	Olive Oil in which Elder leaves have been boiled.
Cabotz.....	Kousso.
Cacao Butter.....	Oil of Theobroma.
Cactus Grandiflorus.....	Cereus.
Caddis.....	Cotton Wool.
Caffeine Di-iodo-hydriodide..	Caffeine Iodide.
Caffeine Tri-iodide.....	Caffeine Iodide.
Calabar Bean.....	Physostigma.
Calcidin*.....	Calcium Iodide.
Calcii Phosphas Di-Acidus...	Monobasic Calcium Phosphate.
Calcii Phosphas Mono-acidus.	Dibasic Calcium Phosphate.
Calcined Gypsum.....	Exsiccated Calcium Sulphate.
Calcined Mercury.....	Red Mercuric Oxide.
Calcinol.....	Calcium Iodate.
Calciostab*.....	Calcium Thiosulphate Injection.
Calcium Sulphide.....	Sulphurated Lime.
Calcium-Diuretin*.....	Theobromine Calcium Salicylate.
Calcium-Sandoz*.....	Preparations of Calcium Gluconate.
Calcotheobromine*.....	Theobromine Calcium Salicylate.
Calisaya Essence.....	Elixir of Cinchona.
Calomel.....	Mercurous Chloride.
Calomel Cream.....	Ung. Hydrarg. Subchlor. Co., B.P.C.
Calorific Wool.....	Gossypium Capsici, B.P.C.
Calsolact*.....	Calcium Sodium Lactate.
Calx.....	Calcium Oxide.
Calx Avis.....	Bird Lime.
Calx Hydrargyri Alba.....	Ammoniated Mercury.
Campeachy Wood.....	Logwood.
Camphine.....	Oil of Turpentine.
Camphire.....	Camphor.
Campho-Phenique.....	Camphor 1, Phenol 1.
Camphor Ice.....	Ung. Camph. Dur., B.P.C.
Camphor Julep or Mixture..	Camphor Water.
Camphor, Tincture of.....	Spirit of Camphor.
Camphorated Oil.....	Linimentum Camphoræ, B.P.
Camphre de Persil.....	Apiol.
Campolon*.....	Liver Extract Injection.
Canada Turpentine.....	Canada Balsam.
Canadian Ash.....	Commercial Potassium Carbonate.
Canadian Hemp.....	Apocynum.
Canary Seed.....	Seed of <i>Phalaris canariensis</i> .
Canna Starch.....	Starch from Root of <i>Canna edulis</i> .
Cantan*.....	Ascorbic Acid.
Canton's Phosphorus.....	Calcium Sulphide.
Capivi.....	Copaiba.
Caprokol*.....	Solution of Hexyl-Resorcinol.

Capsicin.....	Oleoresina Capsici, B.P.C.
Capsogen*	Tela Carbasi et Gossypii Capsici, B.P.C.
Capsulæ Amylaceæ.....	Cachets.
Caput Mortuum.....	Native Ferric Oxide.
Caramania Gum.....	Tragacanth substitute, obtained from a species of <i>Prunus</i> .
Carbamide.....	Urea.
Carbolate.....	Phenate.
Carbazotic Acid.....	Trinitrophenol.
Carbolic Camphor.....	Phenol cum Camphora, B.P.C.
Carbolised Tow.....	Stupa Phenolis.
Carbon, Disinfecting.....	Naphthalene in blocks.
Carbonate of Iron.....	Red Precipitated Ferric Oxide.
Carbonate of Potash†.....	Potassium Bicarbonate.
Carbonate of Soda†.....	Sodium Bicarbonate.
Carbonic Anhydride.....	Carbon Dioxide.
Carbonic Snow.....	Solid Carbon Dioxide.
Carboserin*.....	Activated Charcoal.
Carburet of Iron.....	Graphite.
Cardiazol*.....	Leptazol.
Cardophyllin*.....	Theophylline with Ethylenediamine.
Cargentos*.....	Mild Silver Proteinate.
Carica.....	Figs.
Carlsbad Powder, Effervescent	Sal Carol. Fact. Efferv., B.P.C.
Carminative Mixture.....	Mist. Sod. Bicarb. Aromat., B.P.C.
Carnauba Wax.....	Wax from Leaves of <i>Copernicia cerifera</i> .
Carob Gum.....	From the endosperms of the seeds of <i>Ceratonia siliqua</i> .
Carolina Pink.....	Spigelia.
Carpathian Balsam.....	Riga Balsam.
Carrageen.....	Chondrus.
Carron Oil.....	Lin. Calc. Hydrox. c. Ol. Lini, B.P.C.
Carthamin.....	Red Colouring matter of Safflower.
Carvol.....	Carvone.
Casca Bark.....	Erythrophloeum.
Cascarillo.....	Cascarilla Bark.
Cashew Nut.....	Seed of <i>Anacardium occidentale</i> .
Cassiterite.....	Tinstone.
Castellani's Ointment.....	Resorcinol 60 gr., Salicylic Acid 10 gr., Lanolin and Soft Paraffin to 1 oz.
Castile Soap.....	Sapo Durus, B.P., from Olive Oil.
Castor Oil Pills.....	Aperient Pills (e.g., Compound Rhubarb) containing Castor Oil.
Catheter Oil.....	Oleum Lubricans, B.P.C.
Cat's Hair.....	Euphorbia.
Caustic Alcohol.....	Solution of Sodium Ethylate.
Caustic Barley.....	Sabadilla.

†For medicinal purposes Carbonate of Potash means Bicarbonate. In other cases the meaning is doubtful.

†For medicinal and domestic purposes Carbonate of Soda means Bicarbonate. Technical workers and photographers, on the other hand, generally mean the Carbonate.

Cauterium Potentiale.....	Caustic Potash.
Cayenne.....	Capsicum. *
Celin*.....	Ascorbic Acid.
Celite.....	Diatomite.
Celloidine.....	Pyroxylin.
Cellosolve*.....	Ethylene glycol monoethylether.
Cera Alba Placent.....	White Beeswax in Cakes.
Ceratum Album.....	Spermaceti Ointment.
Ceratum Cantharidis.....	Cantharides Ointment.
Ceratum Epsuloticum.....	Calamine Cerate (1 in 5).
Ceratum Galeni.....	Ung. Rosæ Album, B.P.C.
Ceratum Resinæ.....	Colophony Ointment.
Ceratum Rosatum.....	Ung. Rosatum.
Ceratum Sabinæ.....	Ung. Sabinæ.
Cerecloth Salve.....	Iron Plaster (in lump).
Cereoli.....	Medicated Bougies.
Cerussa.....	Lead Carbonate.
Cevine.....	Sabadinine.
Cevitamic Acid.....	Ascorbic Acid.
Chalcanthum.....	Ferrous Sulphate.
Chalybeate Plaster.....	Iron Plaster.
Chalybeated Tartar.....	Tartrated Iron.
Chalybis Rubigo Præparatus..	Iron Rust.
Chamomille.....	Anthemis.
Chamomilla.....	Matricaria.
Chapman's Dinner Pills.....	Aloes and Ipecacuanha Pills.
Chaput's Alcohol Solution...	Amylocaine Hydrochloride 0.08 g., Alcohol (95%) 0.2 ml., Water to 2 ml.
Chaput's Solution.....	Amylocaine Hydrochloride 0.1 g., Sod- ium Chloride 0.1 g., Water to 1 ml.
Charas.....	Resin of Indian Hemp.
Charta Fumifera.....	Asthma Paper.
Charta Nitrata.....	Nitre Paper.
Charta Picea.....	Poor Man's Plaster.
Chaubert's Oil.....	Oil of Turpentine 3, Oil of Hartshorn 1.
Cheatle's Green Spray.....	Sublimate Malachite Green Solution.
Chelsea Pensioner.....	Conf. Guaiac. Co., B.P.C.
Cheltenham Salt.....	Sodium Sulphate 34, Magnesium Sul- phate 23, Sodium Chloride 50.
Cherry-laurel.....	Laurocerasus.
Chian Turpentine.....	Oleoresin from <i>Pistacia Terebinthus</i> .
Chicory.....	Root of <i>Cichorium intybus</i> .
Chili Saltpetre.....	Sodium Nitrate.
Chillie Paste.....	Ung. Capsic. Co., B.P.C.
China.....	Cinchona.
China Clay.....	Kaolin.
China Root.....	Galanga.
China-stone.....	A variety of felspar.
Chinæ Cortex.....	Cinchona Bark.
Chinese Blistering Beetle...	Mylabris.
Chinese Cantharides.....	Mylabris.
Chinese Cinnamon.....	Cassia Bark.

Chinese Red.....	Red Mercuric Sulphide.
Chinic Acid.....	Quinic Acid.
Chininum.....	Quinine.
Chininum Carbonicum.....	Aristoquinine.
Chinolin.....	Quinoline.
Chirayta.....	Chiretta.
Chloralamide.....	Chloral Formamide.
Chloralose.....	Glucochloral.
Chloramide.....	Chloral Formamide.
Chloramide of Mercury.....	Ammoniated Mercury.
Chloratum.....	Chloride.
Chlorazene*.....	Chloramine-T.
Chlorcosane.....	Chlorinated Paraffin.
Chloretone*.....	Chlorbutol.
Chloretum Apomorphicum.....	Apomorphine Hydrochloride.
Chlorhydric Acid.....	Hydrochloric Acid.
Chloric Ether.....	Spirit of Chloroform.
Chloride of Lime.....	Chlorinated Lime.
Chlorinated Xylenol.....	Chloroxylenol.
Chlorobutanol.....	Chlorbutol.
Chlorodyne.....	Tinct. Chlorof. et Morph., B.P.C.
Chloro-methyl.....	Methyl Chloride.
Chloroxylenol.....	Chloro-hydroxy-xylene.
Chloryl Anæsthetic.....	Ethyl Chloride.
Chlorilen*.....	Trichlorethylene.
Chlor-Zinc-Iodine.....	Schulze's Solution.
Chocolate Nut.....	Theobroma Seeds.
Cholera Mixture, Board of Health.....	Mistura Cretæ Composita, B.P.C.
Chrome Orange.....	Lead Oxychromate.
Chrome Red.....	Lead Dichromate.
Chrome Yellow.....	Lead Chromate.
Chromic Acid.....	Chromium Trioxide.
Chromic Anhydride.....	Chromium Trioxide.
Chromite.....	Chrome Iron Ore.
Chromule.....	Chlorophyll.
Chrysotite.....	White Asbestos.
Cibazol*.....	Sulphathiazole.
Cibus Deorum.....	Asafetida.
Cicuta.....	Conium.
Cicutine.....	Coniine.
Cignolin*.....	Dithranol.
Cimolite.....	Purified Fuller's Earth.
Cinchona Febrifuge.....	Mixed Cinchona Alkaloids.
Cinchona, Pale.....	Bark of <i>Cinchona officinalis</i> .
Cinchona, Red.....	Bark of <i>Cinchona succirubra</i> .
Cinchona, Yellow.....	Bark of <i>Cinchona Calisaya</i> .
Cineole.....	Eucalyptol.
Cinnabar.....	Red Mercuric Sulphide.
Cinnamal.....	Cinnaldehyde.
Cinnamon Bark, Wild.....	Canella Bark.
Cinnamyllic Acid.....	Cinnamic Acid.

Cirussa.....	Lead Carbonate.
Citrine Ointment.....	Ung. Hydrarg. Nit. Fort., B.P.
Citrosalic Acid.....	Methylenecitrylsalicylic Acid.
Clap Mixture.....	Mist. Pot. Cit. et Hyoscyam.
Clemens's Solution.....	Liq. Pot. Arsen. et Brom., B.P.C.
Clinestrol*.....	Stilbcestrol.
Clysmæ or Clyster.....	Enema.
Cobaltite.....	Cobalt Sulpharsenide.
Coccus Cacti.....	Cochineal.
Coffeine.....	Caffeine.
Cola Seeds.....	Kola.
Colcothar.....	Native Ferric Oxide.
Colemanite.....	Calcium Borate.
Colic Root.....	Aletris.
Collargol*.....	Colloidal Silver.
Collodium Callosum.....	Collod. Salicyl. Co., B.P.C.
Collodium Elasticum.....	Flexible Collodion.
Colloxylinum.....	Pyroxylin.
Collumina*.....	Colloidal Aluminium Hydroxide.
Collunarium *Acidi Carbolici Compositum.....	Liquor Boracis Compositus, B.P.C.
Collunarium Alkalinum.....	Liquor Alkalini, B.P.C.
Colombo Root.....	Calumba Root.
Coloquintide.....	Colocynth.
Colsalanyde*.....	Sulphanilamide.
Columbite.....	Columbium Ore.
Colza Oil.....	Rape Oil.
Commander's Balsam.....	Tinct. Benzoin. Co., B.P.
Compound Elixir of Viburnum Prunifolium.....	Elix. Viburn. et Hydrast., B.P.C.
Compound Liniment of Birch	Lin. Methyl. Salicyl., B.P.C.
Compound Pills of Asafetida.....	Pil. Galbani Composita, B.P.C.
Compound Soap Pills.....	Pil. Sap. c. Opio, B.P.C.
Compound Solution of Potas- sium Carbolate.....	Liq. Pot. Phenat. Co., B.P.C.
Compound Solution of Sodium Carbolate.....	Liq. Sod. Phenat. Co., B.P.C.
Compound Spirit of Pimento.	Sp. Myrciæ Co., B.P.C.
Compound Tincture of Phos- phorus.....	Liq. Phosphor. Co., B.P.C.
Conarium.....	Pineal Body.
Conessi Bark.....	Holarrhena.
Confectio Cynosbati.....	Confectio Rosæ Caninæ, B.P.C.
Confection of Hips.....	Confectio Rosæ Caninæ, B.P.C.
Conicine.....	Coniine.
Conine.....	Coniine.
Conserva Amygdalarum.....	Compound Powder of Almonds.
Convolvulin.....	Jalapin.
Copper Oxyacetate.....	Basic Copper Acetate.
Copperas.....	Ferrous Sulphate.
Copperas, Blue.....	Copper Sulphate.
Copperas, Green.....	Ferrous Sulphate.

Copperas, White.....	Zinc Sulphate.
Coprah Oil.....	Coconut Oil.
Coramine*.....	Injection of Nikethamide, B.P.
Corn Paint.....	Compound Salicylic Collodion.
Corn Plaster.....	Compound Salicylic Plaster.
Corn Rose.....	Red Poppy.
Corn Silk.....	Maize Stigmas.
Corn Starch.....	Maize Starch.
Corn Syrup.....	Liquid Glucose.
Corrosive Sublimate.....	Mercuric Chloride.
Cortigen*.....	Suprarenal Cortical Hormone.
Cortin.....	Extract of Suprarenal Cortex.
Corundum.....	Natural Aluminium Oxide.
Corvotone*.....	Nikethamide.
Corymbine.....	Yohimbine.
Corynine.....	Yohimbine.
Cosmetic Bismuth.....	Bismuth Subchloride.
Cosmetic Mercury.....	Ammoniated Mercury.
Coster's Paste.....	Pig. Ol. Pic. c. Iod., B.P.C.
Cotton Root Bark.....	Rootbark of <i>Gossypium</i> sp.
Couch Grass.....	Agropyrum.
Cough Moss.....	Syrup of Horehound.
Cough Pill.....	Ipecacuanha Pill with Squill.
Coumaric Anhydride.....	Coumarin.
Count Palma's Powder.....	Magnesium Carbonate.
Countess Powder.....	Cinchona Bark in powder.
Cowitch.....	Cowhage.
Cowrie Gum.....	Gum Dammar.
Crab Ointment.....	Mercurial Ointment.
Crab's Eyes.....	Prepared Chalk.
Cramp Bark.....	Bark of <i>Viburnum opulus</i> .
Cream of Tartar.....	Potassium Acid Tartrate.
Creasote.....	Creosote.
Crème Impératrice.....	Bismuth Subchloride 30, Zinc Oxide 30, Wool Fat 5, Oil of Rose 0·1; Prepared Lard to 100.
Cremor Bismuthi.....	Glycerin of Bismuth Carbonate.
Cremor Magnesiae.....	Mixture of Magnesium Hydroxide.
Creosotal.....	Creosote Carbonate.
Crespigny's Pills.....	Aloes 2 gr., Mastic $\frac{1}{2}$ gr.
Cresyl Hydrate.....	Cresol.
Cresylic Acid.....	Cresol.
Creta Fullonica.....	Fuller's Earth.
Creyat.....	Andrographis.
Crisalbine*.....	Gold Sodium Thiosulphate.
Crocidolite.....	Blue Asbestos.
Crocus.....	Saffron.
Crocus Antimony.....	Sulphurated Antimony.
Crocus in Fæno.....	Saffron.
Crocus Ferri.....	Ferric Oxide.
Crocus Martis.....	Ferric Oxide.
Crocus Martis Astringens....	Iron Rust.

Crocus Metallorum.....	Sulphurated Antimony.
Crocus in Placentâ.....	Cake Saffron, usually adulterated.
Croton-chloral Hydrate.....	Butyl-chloral Hydrate.
Crystalli.....	Tartaric Acid in Crystals.
Crystallisable Benzene.....	Benzene.
Crysto-Vibex*.....	Aneurine Hydrochloride.
Cube Root.....	Lonchocarpus Root.
Cubeb Paste.....	Powdered Cubebs mixed with Copaiba.
Cubic Nitre.....	Sodium Nitrate.
Culver's Root.....	Leptandra.
Cumaric Anhydride.....	Coumarin.
Cupameni.....	Acalypha.
Cuprol*.....	Copper Nucleinate.
Curdling Fluid.....	Essence of Rennet.
Curschmann's Solution.....	Inj. Camph. Æther., B.P.C.
Cutch.....	Black Catechu.
Cyankali.....	Potassium Cyanide.
Cyclonal Sodium*.....	Soluble Hexobarbitone.

DAFFY'S ELIXIR.....	Compound Tincture of Senna (<i>approx.</i>)
Dagenan*.....	Sulphapyridine.
Dakin's Solution.....	Liq. Sod. Chlorinat. Chir., B.P.
Dalmatian Insect Flowers.....	Pyrethrum Flower.
Dandelion Root.....	Taraxacum.
Danish Ointment.....	Ung. Potass. Polysulph., B.P.C.
Daufresne's Solution.....	Liq. Sod. Chlorinat. c. Sod. Bicarb., B.P.C.
Davitamon B*.....	Aneurine Hydrochloride.
De Valangin's Solution.....	Arsenic Trioxide 1½ gr., Hydrochloric Acid 30 m., Distilled Water to 1 oz.
Deadly Nightshade Leaf.....	Belladonna Leaf.
Decoction of Couch Grass.....	Decoction Agropyri, B.P.C.
Decoction of Triticum.....	Decoction Agropyri, B.P.C.
Decoctum Amyli.....	Mucilage of Starch.
Decoctum Senegæ.....	Infusion of Senega.
Decoctum Uvæ Ursi.....	Infusion of Bearberry.
Decolourising Carbon.....	Activated Charcoal.
Dens Leonis.....	Taraxacum.
Deodorised Alcohol.....	Rectified Spirit.
Dermatol*.....	Bismuth Subgallate.
Dermogen.....	Zinc Peroxide.
Derobin*.....	Dithranol.
Devil's Dung.....	Asafetida.
Devil's Milk.....	Euphorbia Peplus.
Diacetylmorphine Hydrochloride.....	Diamorphine Hydrochloride.
Diachylon Ointment.....	Ung. Plumb. Oleat., B.P.C.
Diachylon Plaster.....	Emplastrum Plumbi.
Diacodium.....	Syrup of Red Poppy.
Dial*.....	Allobarbitone.
Diallylbarbituric Acid.....	Allobarbitone.

Diallylmalonylurea.....	Allobarbitone.
Diapente.....	Gentian Root in powder 8, Bayberry in powder 1.
Diatomite.....	Purified Kieselguhr.
Dichlorethane.....	Ethylene Dichloride.
Dick Test.....	Scarlet Fever Test.
Dicodid*.....	Dihydrocodeinone Acid Tartrate (or Hydrochloride).
Dietetic Peptone.....	Beef Peptone.
Diethylbarbituric Acid.....	Barbitone.
Diethylmalonylurea.....	Barbitone.
Digallic Acid.....	Tannic Acid.
Digestive Elixir.....	Stronger Glycerin of Pepsin 12.5, Diluted Hydrochloric Acid 2.5, Aromatic Elixir to 100.
Digestive Salt.....	Pepsin 3, Sodium Chloride to 100.
Digitaline Crystallisée.....	Digitoxin.
Digitalinum Purum Germanicum.....	Digitalin.
Dilaudid*.....	Dihydromorphinone Hydrochloride.
Dill.....	Anethum.
Dimatos.....	Diatomite.
Dimenformon*.....	Cestradiol Benzoate.
Dimethyl Carbinol.....	Isopropyl Alcohol.
Dimethyl Oxyquinizine.....	Phenazone.
Dimethylaminophenazone.....	Amidopyrine.
Dimethylarsonic Acid.....	Cacodylic Acid.
Dimethylbenzene.....	Xylene.
Dimethylethylcarbinol.....	Amylene Hydrate.
Dimethylketone.....	Acetone.
Dinitrocellulose.....	Pyroxylin.
Dinner Pills.....	Aloes 2 gr., Mastic $\frac{1}{2}$ gr.
Diosma.....	Buchu.
Diphenylketone.....	Benzophenone.
Dipotassium Hydrogen Phosphate.....	Potassium Phosphate.
Dippel's Acid Elixir.....	Aromatic Sulphuric Acid.
Dippel's Oil.....	Bone Oil.
Disodium Hydrogen Arsenate	Anhydrous Sodium Arsenate.
Disodium Hydrogen Phosphate.....	Sodium Phosphate.
Dita Bark.....	Alstonia.
Dithymol-diiodide.....	Thymol Iodide.
Diuretic Salt.....	Potassium Acetate.
Diuretin*.....	Theobromine and Sodium Salicylate.
Dobell's Solution.....	Liquor Boracis Compositus, B.P.C.
Dog-Grass.....	Rhizome of <i>Cyrodon Dactylon</i> .
Dolichi Pubes.....	Cowhage.
Dolichos Pruriens.....	Cowhage.
Donovan's Solution.....	Liq. Arsen. et Hydrarg. Iod., B.P.
Doom Bark.....	Sassy Bark.
Dormigene*.....	Bromoisovalerianylurea.

Doryl*.....	Carbachol.
Double Cyanide Dressing....	Standard Dressing No. 1.
Double Cyanide Gauze.....	Carbas. Hydrarg. et Zinc. Cyanid., B.P.C.
Draconis Resina.....	Dragon's Blood.
Draco Mitigatus.....	Calomel.
Drawing Ointment.....	Unguentum Colophonii, B.P.C.
Dugong Oil.....	Oil from <i>Halicore australis</i> and <i>H.</i> <i>Dugong</i> .
Dulcamaræ Caulis.....	Bittersweet.
Dulcin.....	<i>p</i> -Phenetolcarbamide (used as an al- ternative for Saccharin).
Duodenin.....	Secretin.
Duplas' Solution.....	Amylocaine Hydrochloride 0.06 g., Caffeine 0.1 g., Sodium Benzoate 0.1 g., Water to 2 ml.
Durant's Injection.....	Guaiacol 5, Iodine 1, Potassium Iodide 10, Olive Oil 100.
Dusting Powder.....	Pulv. Zinc. Co., B.P.C.
Dutch Drops.....	Preparation made by heating Linseed Oil 4, Sulphur 1, and dissolving in 15 of Oil of Turpentine.
Dwale.....	<i>Atropa Belladonna</i> .
Dyer's Alkanet.....	Anchusa.
Dyer's Saffron.....	Safflower.
E.P.I.	Emetine Periodide.
Earl Warwick's Powder.....	Compound Powder of Scammony.
Earth Nut Oil.....	Arachis Oil.
East Indian Root.....	Galanga.
Easton's Pills.....	Pil. Ferr. Phosph. c. Quinin. et Strych., B.P.C.
Easton's Syrup.....	Syr. Ferr. Phosph. c. Quinin. et Strych., B.P.
Eatan*.....	Essence of Beef.
Eau d'Alibour†.....	Lotio Cupro-Zincica.
Eau d'Arquebusade.....	Wound Water (<i>q.v.</i>).
Eau de Botot†.....	Oil of Anise 20, Oil of Peppermint 13, Tincture of Saffron 5, Alcohol (70%) to 1,600.
Eau de Javelle.....	Chlorinated Potash Solution.
Eau de Labarraque.....	Quarter strength of Liq. Sod. Chlorinat., B.P.C.
Eau de Luce.....	Tinct. Ammon. Co., B.P.C.
Eau de Naphe.....	Orange-flower Water.
Eau de Rabel.....	Sulphuric Acid 1, Rectified Spirit 3, by weight, mixed with caution.
Eau de Raspail.....	Aqua Sedativa.
Eau Sédative.....	Aqua Sedativa.

†Other formulæ are in use.

Eau de Vie	Brandy.
Ecboiline	Ergotoxine.
Effervescent Tartarated Soda Powder	Pulv. Efferv. Co., B.P.
Effervescing Mouth-Wash Tablets	Solvellæ Antisepticæ, B.P.C.
Effervescing Solution of Magnesium and Potassium Citrates	Liq. Mag. Cit., B.P.C.
Egg Liniment	Lin. Alb., B.P.C. 1934.
Egyptian Henbane	<i>Hyoscyamus muticus</i> .
Ehrlich-Hata	Arsphenamine.
Elastic Adhesive Wound Dressings	Standard Dressings Nos. 3, 4, 5 and 6.
Elastic Collodion	Flexible Collodion.
Elastica	India-Rubber.
Elder Flowers	Sambucus.
Elecampane	Inula.
Electuary Piperis	Confection of Pepper.
Electuary	Confection.
Elemi, Brazilian	From <i>Protium heptaphyllum</i> .
Elemi, East African	From <i>Boswellia Frereana</i> .
Elemi, Manila	From <i>Canarium luzonicum</i> .
Elemi, Mexican	From <i>Amyris Plumieri</i> .
Elityran*	Standardised Thyroid Extract.
Elixir of Aloes	Compound Tincture of Aloes.
Elixir Calcii Chloridi	Syrupus Calcii Chloridi, B.P.C.
Elixir Calisayæ	Elixir of Cinchona.
Elixir Ficorum	Compound Syrup of Figs.
Elixir Glusidi	Elixir Saccharini, B.P.C.
Elixir Glycerophosphatum	Glycer. Glycerophosph. Co., B.P.C.
Elixir Glycerophosph. c. Medull. Rub. }	Glycer. Glycerophosph. c. Medull. Rub., B.P.C.
Elixir ad Longam Vitam	Compound Tincture of Aloes.
Elixir Pectorale	King of Denmark's Chest Mixture.
Elixir Potato	Compound Tincture of Aloes.
Elixir Proprietatis	Tinct. Aloes et Myrrh., B.P.C.
Elixir Purgans	Compound Tincture of Jalap.
Elixir Rhei	Liq. Rhei Dulc., B.P.C.
Elixir Salutis	Compound Tincture of Senna.
Elixir Stomachicum	Compound Tincture of Gentian.
Elixir Traumaticum	Compound Tincture of Benzoin.
Elixir of Vitriol	Acid. Sulph. Aromat., B.P.C.
Emétique	Potassium Antimonyltartrate.
Emollient Ointment	Ung. Adip. Lan. Co., B.P.C.
Emplastrum Album	Calomel Plaster, 20 per cent.
Emplastrum Belladonnæ Fluidum	Collodium Belladonnæ, B.P.C.
Emplastrum Cephalicum	Plaster of Pitch.
Emplastrum Cerati Saponis	Emp. Sap. Fusc., B.P.C.
Emplastrum Commune	Plaster of Lead.
Emplastrum Epispasticum ...	Plaster of Cantharidin.

Emplastrum Gummosum	Plaster of Galbanum.
Emplastrum Lyttæ	Plaster of Cantharides.
Emplastrum Pauperis	Plaster of Pitch.
Emplastrum Resinæ	Emplastrum Colophonii, B.P.
Emplastrum Roborans	Emplastrum Ferri, B.P.C.
Emplastrum Thuris	Emplastrum Ferri, B.P.C.
Emulsio Acaciæ Arabicæ	Mucilage of Acacia.
Emulsio Amygdalæ	Almond Mixture.
Emulsio Communis	Almond Mixture.
Emulsio Guaiaci	Guaiacum Mixture.
Emulsio Iodoformi	Glycerinum Iodoformi, B.P.C.
Emulsio Scammonii	Scammony Mixture.
Emulsio Simplex	Almond Mixture.
Enema Catharticum	Magnesium Sulphate 6, Olive Oil 6, Mucilage of Starch 90.
Enema Nutriens	Dextrose Enema.
English Hawthorn	<i>Crataegus Oxycantha</i> .
English Mandrake	Bryony.
English Salt	Magnesium Sulphate.
Enterovioform*	Iodochlorhydroxyquinoline in Tablets.
Entoral*	Oral Cold Vaccine.
Epanutin*	Soluble Phenytol.
Ephetonin*	Synthetic Ephedrine.
Epinephrine	Adrenaline.
Eptoin*	Soluble Phenytol.
Erasmus Wilson's Hair Oil	Lot. Ol. Amygdal. Ammon., B.P.C.
Erbolin*	Defatted Ergot.
Ergamine*	Histamine.
Ergobasine	Ergometrine.
Ergodex*	Standardised Ext. Ergot. Liq.
Ergonovine	Ergometrine.
Ergostetrine	Ergometrine.
Ergothane*	Solution of Ergotoxine Ethanesulphonate
Ergotine	Ext. Clavicipis, Fr. Cx.
Ergotocin	Ergometrine.
Ergotrate*	Ergometrine Maleate.
Ernutin*	Standardised solution of Ergotoxine, Tyramine, and Ergamine.
Erugon*	Testicular Hormone.
Erythroid*	Desiccated Stomach.
Erythrol Tetranitrate (50%)	Diluted Erythrityl Tetranitrate.
Eschatin*	Extract of Suprarenal Cortex.
Eserine	Physostigmine.
Essence of Bergamot	Oil of Bergamot.
Essence of Bigarade	Oil of Bitter-Orange Peel.
Essence of Bitter Almonds	Sp. Amygdal. Amar., B.P.C.
Essence of Camphor	Rubini's Essence.
Essence of Ginger	Strong Tincture of Ginger.
Essence of Mirbane	Nitrobenzene.
Essence of Pennyroyal	Spiritus Pulegii, B.P.C.
Essence of Peppermint	Sp. Menth. Pip., B.P.
Essence of Pine	Oil of Pine.

Essence of Portugal	Oil of Orange.
Essence of Pulegium	Spiritus Pulegii, B.P.C.
Essence of Ratafia	Essence of Almonds (<i>approx.</i>).
Essence of Smoke	Pyroigneous Acid, <i>i.e.</i> , Crude Acetic Acid.
Essence of Sugar	Oxalic Acid.
Essence of Viper	Tincture of Cantharides.
Essentia Pulegii	Spiritus Pulegii, B.P.C.
Essential Oil of Camphor	Rectified Oil of Camphor.
Essogen*	Vitamin A concentrate.
Ethamolin*	Ethanolamine Oleate.
Ether, Hydrobromic	Ethyl Bromide.
Ether, Hyponitrous	Ethyl Nitrite.
Ether, Ozonic	Ethereal Solution of Hydrogen Peroxide.
Ether Soap	Liquor Saponis Æthereus, B.P.C.
Ethereal Tincture of Iodine	Liquor Iodi Æthereus, B.P.C.
Ethidol*	Ethyl Iodoricinoleate.
Ethiop's Mineral	Black Mercuric Sulphide.
Ethocaine	Procaine.
Ethocaine Borate	Borocaine.
Ethyl Aminobenzoate	Benzocaine.
Ethyl Carbamate	Urethane.
Ethyl Hydroxide	Pure Ethyl Alcohol.
Ethyl Methylcinchoninate	Neocinchophen.
Ethyl Oxide	Ether.
Ethyl Urethane	Urethane.
Ethylic Alcohol	Ethyl Alcohol.
Ethylic Ether	Ether.
Eucaïne	Benzamine.
Eucodeine	Codeine Methylbromide.
Eucortone*	Suprarenal Cortex Extract.
Euflavine Finger Dressing	Standard Dressing No. 10.
Eugallol*	Pyrogallol Monoacetate.
Eugastrol*	Desiccated Stomach.
Eugenic Acid	Eugenol.
Eukodal*	Dihydroxycodeinone Hydrochloride.
Eumydrin*	Atropine Methylnitrate.
Euonymin	Extractum Euonymi, B.P.C.
Eupad	A mixture of equal parts of Chlorinated Lime and Boric Acid.
Euparatone*	Standardised Solution of Parathyroid Hormone.
Eupeptone*	Therapeutic and Bacteriological Peptones.
Euresol*	Resorcinol Monoacetate.
Eusol	Liq. Calc. Chlorinat. c. Acid. Boric., B.P.C.
Euvalerol*	Compound Elixir of Valerian.
Everlasting Pills	Pills of Metallic Antimony.
Evipan*	Hexobarbitone.
Exalgin*	Methylacetanilide.

Examen*.....	Concentrated Liver Extract.
Exeter Oil.....	Oil of Elder, mixed with Euphorbium, Mustard, etc.
Exhepa*.....	Dried Liver Extract.
Extomak*.....	Desiccated Stomach.
Extract of Lead.....	Strong Solution of Lead Subacetate.
Extract of Scammony.....	Scammony Resin.
Ext. Aloes Aquosum.....	Extract of Aloes.
Ext. Bynes.....	Ext. Malti, B.P.
Ext. Cacti Grandiflori Liquid.	Ext. Cerei Liq., B.P.C.
Ext. Catharticum.....	Compound Extract of Colocynth.
Ext. Cubebæ.....	Oleoresin of Cubeb.
Ext. Elaterii.....	Elaterium.
Ext. Filicis Æthereum.....	Extract of Male Fern.
Ext. Filicis Maris.....	Solid Extract of Male Fern.
Ext. Gummi Rubri Liquidum	Ext. Kino Eucalyp. Liq., B.P.C.
Ext. Ligni Campechensis.....	Liquid Extract of Logwood.
Ext. Opii aquosum I.A.	Ext. Opii Sicc., B.P.
Ext. Saturni.....	Strong Solution of Lead Subacetate.
Ext. Thebaicum.....	Dry Extract of Opium.
Ext. Triticii Liquidum.....	Liquid Extract of Couch Grass.
Ext. Uncariæ.....	Catechu.
Extrait de Chanvre Indien....	Ext. Cannabis, B.P.C.
FABA SANCTI IGNATII.....	St. Ignatius Bean.
Face Seeds.....	Hyoscyamus Seeds.
Factory Eye Drops.....	Guttæ Cocainæ, B.P.C.
Fæx Medicinalis.....	Yeast.
Fæx Sacchari.....	Treacle.
False Unicorn Root.....	Helonias.
Farfaræ Folia.....	Coltsfoot Leaves.
Febrifuge Salt.....	Potassium Chloride.
Fel Tauri Inspissatum.....	Purified Ox Bile.
Felamine*.....	Hexamine Glycocholate.
Femergin*.....	Ergotamine Tartrate.
Fenidina.....	Phenacetin.
Fenina.....	Phenacetin.
Fer Ascoli*.....	Nuclein combined with Iron.
Fermented Oil.....	Oil from Fermented Olives.
Ferri Carb.	Red Precipitated Ferric Oxide.
Ferri Carbonas Solubilis.....	Red Precipitated Ferric Oxide.
Ferri Citro-arsenis	
Ammoniatu.....	Iron and Ammonium Citro-arsenite.
Ferri Filum.....	Iron Wire.
Ferri Limatura.....	Iron Filings.
Ferri Oxidum Nigrum.....	Magnetic Iron Oxide.
Ferri Oxidum Rubrum.....	Ferri Oxidum Calcinatum.
Ferri Peroxidum.....	Brown Precipitated Ferric Oxide.
Ferri Peroxidum Hydratum..	Brown Precipitated Ferric Oxide.
Ferri Pulvis.....	Reduced Iron.
Ferri Rubigo.....	Calcined Iron Oxide.

Ferri Sesquichloridum	Ferric Chloride.
Ferri Sesquioxidum	Calcined Iron Oxide.
Ferri Sesquioxidum Solubile	Red Precipitated Iron Oxide.
Ferri Subcarb.	Red Precipitated Ferric Oxide.
Ferric Oxide, Soluble	Saccharated Iron Oxide.
Ferric Oxyhydrate	Ferric Oxide.
Ferric Valerate	Iron Valerianate.
Ferrier's Snuff	Insuff. Bism. et Morph., B.P.C.
Ferro-Alumen	Iron Alum.
Ferrocitrate of Ammonia	Iron and Ammonium Citrate.
Ferrocyanate	Ferrocyanide.
Ferrocyanide of Iron	Prussian Blue.
Ferrodic*	Granules of Ferrous Phosphate and Glucose.
Ferroso-ferric Oxide	Magnetic Iron Oxide.
Ferrugo	Brown Precipitated Ferric Oxide.
Ferrum Tartaratum	Iron and Potassium Tartrate.
Ferrum Tartarizatum	Iron and Potassium Tartrate.
Ferrum Vitriolatum	Ferrous Sulphate.
Fertilol*	Wheat Germ Oil.
Fever Drops	Compound Tincture of Cinchona.
Fibrolysin*	Thiosinamine Sodium Salicylate.
Fiddle Gum	Tragacanth.
Filicic Acid	Filicin.
Finger Burn Dressing	Standard Dressing No. 10.
Finger Dressing	Standard Dressing No. 7.
Fir Wool Oil	Oil of <i>Pinus sylvestris</i> .
Fish Berries	<i>Cocculus indicus</i> .
Fistula Armata*	Enema Apparatus.
Fixed Nitre	Potassium Carbonate.
Flake White	A Variety of White Lead.
Flavine	Acriflavine.
Flaxseed	Linseed.
Flea Seed	Psyllium.
Fleming's Tinct. of Aconite	Tinctura Aconiti Fortis, B.P.C.
Flesh Liquor	Lard.
Florence Oil	Olive Oil imported from Leghorn.
Flores Naphæ	Orange Flowers.
Flowers of Arsenic	Arsenic Trioxide.
Flowers of Benjamin	Benzoic Acid.
Flowers of Benzoïn	Benzoic Acid.
Flowers of Sulphur	Sublimed Sulphur.
Flowers of Zinc	Zinc Oxide.
Fluid Magnesia	Liq. Mag. Bicarb., B.P.
Fluoric Acid	Hydrofluoric Acid.
Fly Blister	Cantharides Plaster.
Fly Stone	Mercuric Chloride in lumps.
Fold Sheet	Guttapercha Tissue.
Folliculin	Œstrin.
Fomentation Dressing	Standard Dressing No. 2.
Food of the Gods	Asafetida.
Foot Powder	Pulv. Zinc. et Acid Salicyl Co.

Formal.....	Formaldehyde.
Formadermine*.....	Methyleneguaiacol.
Formaldehyde and Menthol Tablets.....	Tabellæ Formaldehydi, B.P.C.
Formaldehydum	
Polymerisatum.....	Paraformaldehyde.
Formalin Throat Tablets.....	Tabellæ Formaldehydi, B.P.C.
Formamine.....	Hexamine.
Formamin Tablets.....	Tabellæ Formaldehydi, B.P.C.
Formin.....	Hexamine.
Formol.....	Formaldehyde Solution.
Formochlorol.....	Formaldehyde Solution.
Formyl Terchloride.....	Chloroform.
Formyl Tribromide.....	Bromoform.
Fossil Flour.....	Diatomite.
Fossil Salt.....	Rock Salt.
Fothergill's Cough Mixture..	Syrup of Squill 2, Dilute Hydrobromic Acid 1, Emulsion of Chloroform 1.
Fouadin*.....	Stibophen.
Fourneau "190"*.....	Acetarsol.
Fourneau "309"*.....	Moranyl (<i>q.v.</i>).
Fousel Oil.....	Crude Amylic Alcohol.
Fowler's Solution.....	Liquor Arsenicalis, B.P.
Foxglove Leaf.....	Digitalis Leaf.
Frankincense.....	Olibanum.
Frankincense, American.....	Gum Thus.
Frankincense Plaster.....	Iron Plaster.
Freezing Salt.....	Crude Sodium Chloride.
French Chalk.....	Magnesium Silicate.
French Tincture of Iodine...	Liq. Iodi Simplex, B.P. (but <i>see</i> E.P., 21st Edn., Vol. I).
Friars' Balsam.....	Tinct. Benzoin. Co., B.P.C.
Fructose.....	Lævulose.
Fuchsine.....	Magenta.
Fuller's Earth.....	Natural Kaolin.
Fumus Potassæ Nitratis.....	Nitre Paper.
Fungus Laricis.....	Agaric.
Fusel Oil.....	Crude Amylic Alcohol.
Fustic Wood.....	Brazil Wood.
GALACTIN.....	Lactogenic principle from anterior pituitary.
Galangal.....	Galanga.
Galen's Cerate.....	Cold Cream.
Gallæ Ceruleæ.....	Gall.
Gallipoli Oil.....	Inferior Olive Oil.
Gallotannic Acid.....	Tannic Acid.
Gambir.....	Catechu.
Ganjah.....	Cannabis.
Gardenal*.....	Phenobarbitone.
Garget.....	Poke Root.

Gascoigne's Powder.....	'Aromatic Powder of Chalk.
Gas-gangrene Antitoxin (perfringens).....	Antitoxinum Welchicum.
Gasman's Drops.....	Liq. Ammon. Fort. 10 m., Tinct. Capsici 10 m., Tinct. Opii 60 m., Aqua Chlorof. ad 8 oz.
Gaster Siccata*.....	Desiccated Stomach.
Gastomag*.....	Magnesium Trisilicate.
Gastrexo*.....	Desiccated Stomach.
Gavelle's Extract.....	Extract of <i>Malva sylvestris</i> .
Gee's Linctus.....	Linct. Scill. Co., B.P.C.
Gelatina Vituli.....	Calf's Foot Jelly.
Gelatinum Ichthammol.....	Pasta Ichthammolis, B.P.C.
Gelatum Petrolei.....	Soft Paraffin.
Geneva.....	Gin.
Genoa Oil.....	Fine Olive Oil.
Gentian Violet, Medicinal....	Crystal Violet.
Geranaldchyde.....	Citral.
German Chamomile.....	Matricaria.
Germanin*.....	Suramin.
Gestone*.....	Solution of Progesterone.
Gestyl*.....	Gonadotrophic hormone from serum of pregnant mares.
Ghatti Gum.....	Indian Gum.
Gilla Theophrasta.....	Zinc Sulphate.
Gingelly Oil.....	Sesame Oil.
Ginger Mint Tablets.....	Tab. Zingib. Co., B.P.C.
Ginseng.....	Root of <i>Panax quinquefolium</i> .
Glanduantin*.....	Gonadotrophic factor of the Anterior Pituitary.
Glandubolin*.....	Preparations of Œstrone.
Glanduitrin*.....	Pituitary (Post. Lobe) Extract.
Glandulæ Lupuli.....	Lupulin.
Glandulæ Rottleræ.....	Kamala.
Glass, Soluble.....	Sodium Silicate.
Glauber's Salt.....	Sodium Sulphate.
Glegg's Mixture.....	Liquid Paraffin 3, White Soft Paraffin 1, with Rosettol or Menthol.
Globuli Prunellæ.....	Potassium Nitrate in Balls.
Glonoin.....	Nitroglycerin.
Glucanth.....	Pill excipient made by mixing 1 of Tragacanth, in powder, with 1 of Distilled Water, and 4 of Syrup of Liquid Glucose.
Glucose-Saline Solution.....	Liq. Dextros. et Sod. Chlor., B.P.C.
Glucosimide.....	Saccharin.
Gluside.....	Saccharin.
Glyceritum.....	Glycerin (of Starch, etc.).
Glycerol.....	Glycerin.
Glycerol Glycerophosphatis..	Glycerinum Glycerophosphatum Compositum, B.P.C.

Glycerol Hypophosphitis	Glycerinum Hypophosphitum Compositum, B.P.C.
Glyceryl Triacetate	Triacetin.
Glyceryl Trinitrate	Nitroglycerin.
Glycocoll	Glycine.
Glycol	Ethylene Glycol.
Glycosum	Dextrose.
Goa Powder	Araroba.
Godfrey's Cordial	Treacle, Water, Sassafras Oil, Alcohol, and Laudanum 1 per cent.
Golden Ointment	Yellow Mercuric Oxide Ointment.
Golden Seal	Hydrastis.
Gomme-gutte	Gamboge.
Gonan*	Anterior pituitary-like hormone from urine of pregnancy.
Gooroo Nuts	Kola Seeds.
Gorit	Calcium Peroxide.
Gossypium Fulminans	Pyroxylin.
Gossypium Stypticum	Ferric Chloride Wool.
Goudron	Tar.
Goudron de Huile	Coal Tar.
Goulard Powder	Lead Acetate.
Goulard Water	Liq. Plumb. Subacet. Dil., B.P.
Goulard's Cerate	Lead Subacetate Ointment.
Goulard's Extract	Liq. Plumb. Subacet. Fort., B.P.
Goulard's Lotion	Liq. Plumb. Subacet. Dil., B.P.
Goulard's Ointment	Lead Subacetate Ointment.
Grain Oil	Crude Amylic Alcohol.
Grains d'Ambrette	Artificial Musk.
Grana Actes	Elderberries.
Grana Tiglia	Croton Seeds,
Granulæ Dioscoridis	Granules containing 1 mg. of Arsenic Trioxide.
Grape Sugar	Dextrose.
Gratia Dei	Plaster of Pitch.
Green Bice	Native Copper Carbonate.
Green Copperas	Crude Ferrous Sulphate.
Green Oil	Oil of Elder.
Green Ointment	Elder Ointment.
Green Tar	Tar.
Green Vitriol	Crude Ferrous Sulphate.
Greenheart Bark	Nectandra Bark or Bebeeru Bark.
Gregory's Dinner Pills	Aloes, Ipecacuanha and Rhubarb Pills.
Gregory's Pill	Compound Pills of Colocynth.
Gregory's Powder	Pulv. Rhei Co., B.P.
Grey Oil	Injectio Hydrargyri Fortis, B.P.C.
Grey Ointment	Mercurial Ointment.
Grey Powder	Hydrargyrum cum Creta, B.P.
Griffith's Mixture	Mist. Ferr. Co., B.P.C.
Griffith's Pill	Myrrh 2, Sodium Carbonate 1, Ferrous Sulphate 1, Treacle 1.
Ground Nut Oil	Arachis Oil.

Grutellum	Groats.
Guaiac	Guaiacum Resin.
Guaiacamphol	Guaiacol Camphorate.
Guaiacyl	Calcium Guaiacolsulphonate.
Guapi Bark	Cocillana.
Guaranine	Caffeine.
Guaza	Cannabis.
Guido's Balsam	Liniment of Opium.
Guimaue	Althæa.
Guinea Grains	Grains of Paradise.
Guinea Pepper	Capsicum.
Gum Animi	Copal.
Gum Arabic	Acacia.
Gum Benjamin	Benzoin.
Gum Camphor	Camphor.
Gum Catechu	Catechu.
Gum Dragon	Tragacanth.
Gum Elemi	Manila Elemi.
Gum Guaiacum	Guaiacum Resin.
Gum Juniper	Sandarac.
Gum Kordofan	Acacia.
Gum Plant	Grindelia.
Gum Sanguis Draconis	Dragon's Blood.
Gum Scammony	Scammony.
Gum Senegal	Acacia.
Gum Thus	American Frankincense.
Gummi Eucalypti	Eucalyptus Kino.
Gun Cotton	Trinitrocellulose.
Gunjah	Cannabis.
Gurjun Balsam	Oleo-Resin of <i>Dipterocarpus turbinatus</i>
Guttæ Hydrargyri Nitratis	Pig. Hydrarg. Nit., B.P.C.
Gutti	Gamboge.
Guy's Pill	Pilulæ Digitalis Compositæ, B.P.C.
Gynæstrol*	Œstradiol in tablets.
Gypsum	Hydrated Calcium Sulphate.
Gypsum, Calcined	Plaster of Paris.
HAARLEM OILS OR HAARLEM	
DROPS	Dutch Drops.
Hæmatocrystalline	Hæmoglobin.
Hahnemann's Mercury	Black Oxide of Mercury.
Haller's Acid Elixir	Sulphuric Acid 1, Alcohol 3, by weight.
Halviva	Chiretta.
Hamamelidin	Extractum Hamamelidis, B.P.C.
Hamamelin	Extractum Hamamelidis, B.P.C.
Hamilton's Pill	Compound Extract of Colocynth 2, Extract of Hyoscyamus 1.
Harrington's Solution	Solution of Mercuric Chloride 8, Hydrochloric Acid 6, Industrial Methylated Spirit 64, Solution of Methylene Blue (2 per cent.) 0.2, Distilled Water to 100.

Harrogate Salts.....	Sal Aperiens Sulphuratum, B.P.C.
Hartmann's Solution.....	Ringer-Lactate Solution, B.P.C.
Hartshorn and Oil.....	Liniment of Ammonia.
Hartshorn Powder.....	Prepared Chalk (<i>approx.</i>).
Hartshorn, Spirit of.....	Solution of Ammonia.
Hashish.....	Cannabis.
Hasting's Naphtha.....	Methyl Alcohol.
Hautsus Sennæ Co.....	Compound Mixture of Senna.
Haw.....	Crategus Oxycantha.
Hawkin's (Dr.) Embrocation.	Ammoniated Liniment of Camphor.
Hay Saffron.....	Saffron.
Hay's Wash.....	Zinc Sulphate Eye Lotion.
Heal-all.....	Collinsonia.
Heavy Spar.....	Barium Sulphate.
Heberden's Ink.....	Aromatic Mixture of Iron.
Hebra's Ointment.....	Ung. Plumb. Oleat., B.P.C.
Heim's Pill.....	Powdered Digitalis $\frac{1}{2}$ gr., Ipecacuanha $\frac{1}{2}$ gr., Powdered Opium $\frac{1}{2}$ gr., Extract of Helenium $\frac{1}{2}$ gr.
Hellebore, Green.....	<i>Veratrum viride.</i>
Hellebore, White.....	<i>Veratrum album.</i>
Helmitol*.....	Formamol.
Hemisine.....	Adrenaline.
Hemlock Gum or Pitch.....	Exudation from <i>Pinus canadensis</i> .
Hemlock Leaf.....	Conium Leaf.
Hemlock Ointment.....	Unguentum Conii.
Hemlock Spruce.....	<i>Pinus canadensis.</i>
Hemp Resin.....	Cannabinone.
Henbane Leaves.....	Hyoscyamus.
Henry's Solution.....	Magnesium Sulphate 48.5, Dilute Sul- phuric Acid 12.5, Water to 100.
Hepar Antimonii Calcareum..	Sulphurated Antimony.
Hepar Sulphuris.....	Sulphurated Potash.
Heparmonie*.....	Liver Extract Injection.
Hepastab*.....	Liver Extract Injection.
Hepatex P.A.F.*.....	Liver Extract Injection.
Hepatic Aloes.....	Liver-coloured Aloes.
Hepatised Ammonia.....	Ammonium Sulphide.
Hepol*.....	Liver Extract Preparations.
Herbygrass.....	Rue.
Heroin.....	Diamorphine.
Hervea*.....	Maté.
Hesketh's Pills, Lady.....	Aloes 2 gr., Mastic $\frac{1}{2}$ gr.
Heusner's Glue.....	Resin 50, Venice Turpentine 5, Methy- lated Spirit 50, Benzene 25.
Hexahydrobenzene.....	Cyclohexane.
Hexahydrocresol.....	Methylcyclohexanol.
Hexahydropyridine.....	Piperidine.
Hexamethylene.....	Cyclohexane.
Hexamethylenetetramine.....	Hexamine.
Hexamethylenetetramine Anhydromethylenecitrate..	Formamol.

Hexanastab*	Soluble Hexobarbitone.
Hexanitrit.	Mannitol Nitrate.
Hey's Wash.	Red Lotion.
Hiera Picra.	Pulvis Aloes et Canellæ, B.P.C.
Hippo Wine.	Ipecacuanha Wine.
Hips.	Rose Fruit.
Hirudin.	Leech Extract.
Hive Powder.	Mercury with Chalk.
Hoedemaker's Pill.	Acetylsalicylic Acid $2\frac{1}{2}$ dr., Arsenic Trioxide $\frac{1}{8}$ gr., Starch and Distilled Water to make 100 pills.
Hoffmann's Anodyne.	Sp. Æther. Co., B.P.C.
Hog Gum.	Tragacanth substitute, obtained from a species of <i>Prunus</i> .
Homborg's Salt.	Boric Acid.
Hombreol*	Solution of Androsterone.
Hops.	Lupulus.
Hordeum Decorticatum.	Pearl Barley.
Horse Brimstone.	Black Sulphur.
Horse Tincture of Myrrh.	Compound Tincture of Myrrh.
Horseradish.	Armoracia.
Horsley's Wax.	Cera Aseptica, B.P.C.
Household Ammonia.	Liquor Ammonia Detergens (q.v.).
Huile de Bouleau.	Obtained by distillation from <i>Betula</i> <i>Alba</i> .
Huile de Pied de Bœuf.	Neatsfoot Oil.
Hulle's Soluble Strychnine.	Strychnine Acid Sulphate.
Humbergum.	Opium.
Humulus.	Lupulus.
Hungary Water.	Spirit of Rosemary, 1 in 50 (approx.).
Hurm.	Harmal.
Hurr Nut.	Myrobalan.
Hutchinson's Pills.	Pil. Hydrarg. c. Cret. et Opii, B.P.C.
Huxham's Tincture of Bark.	Tinctura Cinchonæ Composita, B.P.
Hydnestyle*	Ethyl Esters of Hydnocarpus Oil.
Hydrargyri Ammonio-Chlori- dum.	Ammoniated Mercury.
Hydrargyri Bichloridum.	Mercuric Chloride.
Hydrargyri Chloridum Corros- ivum.	Mercuric Chloride.
Hydrargyri Chlor. Mite.	Mercurous Chloride.
Hydrargyri Murias.	Mercurous Chloride.
Hydrargyri Nitrico-Oxidum.	Red Mercuric Oxide.
Hydrargyri Oxidum Cinereum.	Black Oxide of Mercury.
Hydrargyri Oxymurias.	Mercuric Chloride.
Hydrargyri Oxysulph.	Turpeth Mineral.
Hydrargyri Proto-ioduret.	Green Mercurous Iodide.
Hydrargyri Subchloridum	
Mite.	Mercurous Chloride.
Hydrargyri Submurias.	Mercurous Chloride.
Hydrargyri Suboxidum.	Black Oxide of Mercury.
Hydrargyri Sulphas.	Persulphate of Mercury.

Hydrargyri Sulphas Albus . . .	Persulphate of Mercury.
Hydrargyri Sulphuretum Nigrum	Black Mercuric Sulphide.
Hydrargyri Sulphuretum cum Sulphure	Black Mercuric Sulphide.
Hydrargyri Supermurias	Mercuric Chloride.
Hydrargyrum cum Sulphure . .	Black Mercuric Sulphide.
Hydrargyrum Præcipitatum Album	Ammoniated Mercury.
Hydrastin	Extractum Hydrastis, B.P.C.
Hydriodate	Iodide.
Hydriodic Ether	Ethyl Iodide.
Hydrobromate	Bromide.
Hydrobromic Ether	Ethyl Bromide.
Hydrocarbon Oil	Liquid Paraffin.
Hydrochinon	Hydroquinone.
Hydrochlorate	Hydrochloride.
Hydrochloric Ether	Ethyl Chloride.
Hydrogen Borate	Boric Acid.
Hydrogen Orthophosphate . . .	Phosphoric Acid.
Hydonaphthol	Betanaphthol.
Hydropyrrin*	Lithium Acetylsalicylate.
Hydrosulphuret of Ammonia . .	Ammonium Sulphide.
Hydroxysuccinic Acid	Malic Acid.
Hyperol*	Solid Hydrogen Peroxide.
Hyperoxymuriate of Potash . .	Potassium Chlorate.
Hypnone	Acetophenone.
Hypo	Sodium Thiosulphate.
Hypochlorite Solution	Dakin's Solution.
Hypophysis Cerebri	Pituitary Gland.
Hyposulphite of Soda	Sodium Thiosulphate.
Hysterionica	Damiana.
IBISCUS	Althæa.
Ichthammonium	Ichthammol.
Ichthosulphol	Ichthammol.
Ichthosulphonic Acid	Ichthammol.
Ichthyol*	Oil from Tyrolese Bituminous Schist; similar to Ichthammol.
Idozan*	Colloidal Iron Solution.
Ihle's Paste	Resorcinol, Zinc Oxide, Starch, of each 22 gr., Soft Paraffin to 480 gr.
Illinctus	Linctus.
Illipe	Bassia.
Ilmenite	Iron Titanate.
Imidosuccinate of Mercury . .	Mercury Succinimide.
Indian Belladonna	<i>Atropa acuminata</i>
Indian Birthwort	Aristolochia.
Indian Blistering Flies	Mylabris.
Indian Brandy or Tincture . . .	Spirit of Nitrous Ether 1, Compound Tincture of Rhubarb 1, Syrup 1.

Indian Cerate.....	Lead Acetate Ointment.
Indian Hemp.....	Cannabis.
Indian Jalap.....	Turpeth.
Indian Liquorice.....	Abrus Root.
Indian Melissa Oil.....	Oil of Lemon Grass.
Indian Oil of Verbena.....	Oil of Lemon Grass.
Indian Pink.....	<i>Spigelia</i> .
Indian Sarsaparilla.....	Hemidesmus.
Indian Squill.....	Urginea.
Indian Tobacco.....	Lobelia.
Indian Tragacanth.....	From <i>Sterculia urens</i> Roxb.
Indian Valerian.....	<i>Valeriana Wallichii</i> D.C.
Indigotin.....	Indigo Blue.
Infirmary Plaster.....	Adhesive Plaster on Brown Holland.
Infundibulin*.....	Pituitary (Post. Lobe) Extract.
Infundin*.....	Pituitary (Post. Lobe) Extract.
Infusion of Tar.....	Tar Water.
Infusorial Earth.....	Diatomite.
Infusum Diosmæ.....	Infusion of Buchu.
Insect Flowers.....	Pyrethrum Flower.
Insuff-Iodi et Acid. Boric....	Pulv. Acid. Boric. et Iod.
Iodatol*.....	Iodised Oil.
Iodatum.....	Iodide.
Iodex*.....	Stainless Iodine Ointment.
Iodhydric Acid.....	Hydriodic Acid.
Iodine Blister (<i>veterinary</i>)...	Red Mercuric Iodide Ointment.
Iodinum.....	Iodine.
Iodinol*.....	Iodised Oil.
Iodised Carbolic Acid.....	Phenol Iodisatum, B.P.C.
Iodo-caffeine.....	Sodium-Caffeine Iodide.
Iodoform. Aromaticum.....	Iodoform 49, Coumarin 1.
Iodol.....	Iodopyrrole.
Iodo-Ray*.....	Sodium <i>o</i> -Iodohippurate for injection.
Iodostarin*.....	Di-iodotariric Acid.
Ioduretted Oil.....	Solution of Iodine in Almond Oil, 0.5 per cent.
Ipecine.....	Emetine.
Iridin.....	Extractum Iridis, B.P.C.
Iron Arsenite, Soluble.....	Iron and Ammonium Citro-Arsenite.
Iron Perchloride.....	Ferric Chloride.
Iron Pill.....	Pilula Ferri Carbonatis, B.P.C.
Iron Rust.....	Ferric Oxide.
Isafgul.....	Ispaghula.
Isinglass.....	Ichthyocolla.
Isinglass, Stove.....	Sheet Mica.
Island Cacao.....	Theobroma Seeds.
Issue Peas.....	Orange Berries.
Ivory Black.....	Fine Bone Black.

JACOBSON'S SOLUTION.....	Benzyl Cinnamic Ester.
Jalapin.....	Ether-soluble Jalap Resin.

Jalapin, False or German	Scammony Resin.
Jalapurgin	Jalapin.
Jamaica Dogwood	Piscidia.
Jamaica Pepper	Pimento.
James's Powder	Antimonial Powder (<i>approx.</i>).
Japan Earth	Catechu.
Japan Wax	Wax from the berries of species of <i>Rhus</i> .
Japanese Drops	Japanese Peppermint Oil.
Japanese Isinglass	Agar.
Jarisch's Ointment	Pyrogallol 1, Lard 7.
Jaune Brilliant	Cadmium Sulphide.
Jectemia*	Extract of Liver.
Jephson's Powder	Precipitated Sulphur 2, Guaiacum Resin 1.
Jequirity	Seeds of <i>Abrus precatorius</i> .
Jesuit Tea	Maté.
Jesuits' Bark	Cinchona.
Jesuits' Drops	Comp. Tincture of Benzoin (<i>approx.</i>).
Jewellers' Rouge	Calcined Ferric Oxide.
Jonas' Salve	Iron Plaster.
Jordan Almonds	Sweet Almond.
Jumble Beads	Seeds of <i>Abrus precatorius</i> .
Jungmann's Tooth Powder	Tin (Stannic) Oxide 15, Calcium Carbonate 60, Soap 4, Sugar 5.
Juniper Tar Oil	Oil of Cade.
KALI CAUSTICUM	Solution of Potash.
Kali, Lemon	Sherbet.
Kali Præparatum	Potassium Carbonate.
Kali Sulphuratum	Sulphurated Potash.
Kali Tartarisatum	Potassium Tartrate.
Kali Vitriolatum	Potassium Sulphate.
Kalium	Potassium.
Kalmopyrin*	Calcium Acetylsalicylate.
Kalzana*	Tablets containing Calcium Sodium Lactate.
Kaolin Mass	Unguentum Kaolini, B.P.C.
Kapilon*	Menaphthone.
Kaposi's Compound Ointment	Unguentum Betanaphtholis Compositum, B.P.C.
Karaya Gum	Indian Tragacanth from <i>Sterculia urens</i> Roxb.
Kat	Catha.
Kath	Catha.
Kava-kava	Kava.
Kaylene*	Kaolin.
Kelpware	Fucus.
Kermes Grains	Cochineal.
Kermes Minerale	Sulphurated Antimony.
Kerocain*	Procaine Hydrochloride.
Kerosene	Paraffin Oil.

Ketodestrin*	Solution of Œstrone.
Kharophen*	Acetarsol.
Kharsulphan*	Sulpharsphenamine.
Khella	Ammi Visnaga.
Kieselguhr	Diatomite.
King of Denmark's Chest Mixture	Extract of Liquorice 1, Fennel Water 3, Anisated Liquid Ammonia 1.
King's Yellow	Orpiment.
Kinic Acid	Quinic Acid.
Kino, Australian	Eucalyptus Kino.
Kino, Bengal	Butea Gum.
Kino, Botany Bay	Eucalyptus Kino.
Kino, Cochin	Kino.
Kino, Madras	Kino.
Kino, Malabar	Kino.
Kiryat	Andrographis.
Knob Root	Collinsonia.
Koch's Old Tuberculin	Tuberculinum Pristinum, B.P.
Kokum Butter	Oil from Seeds of <i>Garcinia purpurea</i> .
Kolpon*	Œstrone.
Kombé Strophanthin	Strophanthin.
Koot Root	Costus.
Koptalgos*	Denarcotised preparation of Opium.
Koumiss	Fermented Milk.
Kreat	Andrographis.
Krescone*	Growth Hormone of Anterior Pituitary.
Kroenig's Solution	Amylocaine Hydrochloride 0.08 g., Sodium Chloride 0.0022 g., Water to 2 ml.
Kunth Root	Costus.
Kurchi	Holarrhena.
Kutch	Black Catechu.
Kuth Root	Costus.
Kyanite	Aluminium Silicate.
Kyapootie Oil	Cajuput Oil.
LABARRAQUE'S SOLUTION	Diluted Solution of Chlorinated Soda.
Lac Ammoniaci	Ammoniacum Mixture.
Lac Amygdalæ	Almond Mixture.
Lac Asafetidæ	Enema of Asafetida.
Lac Fermentatum	Koumiss.
Lac Guaiaci	Guaiacum Mixture.
Lac Magnesiae	Mixture of Magnesium Hydroxide.
Lac Rosæ	Lotio Rosæ, B.P.C.
Lac Sulphuris	Precipitated Sulphur.
Lacarnol*	Nucleoside preparation from organic tissues.
Lacmus	Litmus.
Lactagol*	Extract of Cotton Seed.
Lactéol*	Lactic acid-forming bacilli preparations.
Lactobacilline*	Lactic acid-forming bacilli preparations.
Lactucarium	Lettuce Opium.

Lait Virginal.....	Lotio Benzoini, B.P.C.
Lambkin's Mercurial Cream .	Calomel 10 gr., in $\frac{1}{2}$ oz. sterile Olive Oil, with 2 per cent. Phenol.
Lana Philosophica.....	Zinc Oxide.
Lanette Wax SX*.....	A mixture of about 9 parts of Cetyl and Stearyl Alcohols with 1 part of the Sodium Salts of the Sulphated Alcohols.
Lanolin.....	Hydrous Wool Fat.
Lanolin Ointment.....	Ung. Adip. Lan. Hydros., B.P.C.
Lapis Amianthus.....	Asbestos.
Lapis Calaminaris.....	Calamine.
Lapis Divinus.....	Copper Alum.
Lapis Infernalis.....	Silver Nitrate.
Lapis Sanguineus.....	Hæmatite.
Larch Agaric.....	Agaric.
Larch Turpentine.....	Venice Turpentine.
Lard.....	Adeps.
Larostidin*.....	<i>l</i> -Histidine Hydrochloride.
Lassar's Ointment.....	Carbolised Diachylon Ointment.
Lassar's Paste.....	Past. Zinc. Oxid. c. Acid. Salicyl., B.P.C.
Lassar's Stronger Resorcin Paste.....	Pasta Resorcinolis, B.P.C.
Laughing Gas.....	Nitrous Oxide.
Lavender Drops.....	Compound Tincture of Lavender.
Laxative Mixture.....	Compound Mixture of Cascara.
Laxoin*.....	Phenolphthalein.
Lead Lotion.....	Liq. Plumb. Subacet. Dil., B.P.
Leaf Green.....	Chlorophyll.
Lees' Inhalant.....	Ethereal Inhalation of Iodine.
Lemery's White Precipitate .	Ammoniated Mercury.
Lemon Chrome.....	Lead Chromate.
Lenigallol*.....	Pyrogallol Triacetate.
Lenitive Electuary.....	Confection of Senna.
Lentine.....	Metaphenylenediamine Hydrochloride.
Lepidolite.....	Mica containing Lithium.
Leptandrin.....	Extractum Leptandræ, B.P.C.
Lesser Celandine.....	Pilewort.
Lesser Galangal.....	Galanga.
Lettuce Opium.....	Dried Latex of Lettuce.
Leucadol.....	Redistilled Oil of Cajuput.
Leucite.....	Potassium Aluminium Silicate.
Levant Berries.....	Cocculus Indicus.
Levorenine.....	Adrenaline.
Lichen Islandicus.....	Iceland Moss.
Light Oil of Camphor.....	Rectified Oil of Camphor.
Lignilinum.....	Wood Wool.
Lignum Februm.....	Cinchona.
Lignum Sanctum.....	Guaiacum Wood.
Lignum Vitæ.....	Guaiacum Wood.
Ligroin.....	Petroleum Naphtha.

Lilacin	Terpineol.
Lily Aldehyde	Hydroxycitronellal.
Lily of the Valley Flowers	Convallaria.
Lime	Calcium Oxide.
Lime Flowers	Tilia.
Lime Flux	Limestone, chiefly Calcium Carbonate.
Lime, Slaked	Calcium Hydroxide.
Lime Water	Liquor Calcii Hydroxidi, B.P.
Lime Water and Oil	Lin. Calc. Hydrox. c. Ol. Lini, B.P.C.
Limnada Purgative	Liq. Mag. Cit., B.P.C.
Linalool	Linalol.
Linctus	Linctus Scillæ, B.P.C.
Linctus Scillæ Opiatus	Linct. Scill. Co., B.P.C.
Linden Flowers	Tilia.
Lini Farina	Crushed Linseed.
Lini Placenta	Linseed Cake.
Liniment of Lime	Lin. Calc. Hydrox., B.P.C.*
Liniment of Verdigris	Linimentum Æruginis.
Linimentum Æruginis	Verdigris 4·5, Vinegar 32, Honey 63·5.
Linimentum Album Aceticum	Lin. Alb., B.P.C., 1934.
Linimentum Ammonia Fortius	Liniment of Ammonia.
Linimentum Anodynum	Liniment of Opium.
Linimentum Arcæi	Elemi Ointment.
Lin. Betulæ	Lin. Methyl. Salicyl., B.P.C.
Linimentum Boeckii	Dilute Lead Subacetate Solution 18, Talc 18, Starch 18, Glycerin 8.
Linimentum Calcis	Lin. Calc. Hydrox., B.P.C.
Linimentum Camph. Co	* Ammoniated Liniment of Camphor.
Linimentum Cantharidis	Blistering Liquid.
Linimentum Commune	Lin. Alb., B.P.C.
Linimentum Domesticum	Lin. Alb., B.P.C.
Linimentum Iodi	Liq. Iodi Fort., B.P.
Linimentum Iodi Petrolatum	Parogenum Iodi, B.P.C.
Linimentum Lyttæ	Blistering Liquid.
Lin. Methyl. Sal. Simp.	Lin. Methyl. Sal., N.W.F.
Lin. Methyl. Sal. Oleosum	Lin. Methyl. Sal., N.W.F.
Linimentum Saponis Camph.	Liniment of Soap.
Linimentum Saponis Co.	Liniment of Soap.
Linimentum Saponis cum Opio	Liniment of Opium.
Linimentum Universale	Lin. Alb., B.P.C.
Linseed Meal	Linum Contusum, B.P.
Linseed Oil Soap	Potash Soap.
Linseed Tea	Infusum Lini, B.P.C.
Linteum Ferri Perchloridi	Styptic Lint.
Lipiodol*	Iodised Oil.
Lipo-Lutin*	Solution of Progesterone.
Liqueur de Goudron	Solution of Norwegian Tar.
Liqueur de Van Swieten	Mercuric Chloride 1, Alcohol (80 per cent.) 100, by weight, Distilled Water 900.
Liquid Belladonna Plaster	Collodium Belladonnæ, B.P.C.
Liquid Camphor	Rectified Oil of Camphor.

Liquid Cochineal.	Liquor Cocci, B.P.C.
Liquidamber.	Storax.
Liquor Ammoniaë Detergens †	Oleic Acid 1, Alcohol 1; mix and add Strong Solution of Ammonia 7, Distilled Water 7.
Liquor Anodynus Mineralis. .	Compound Spirit of Ether.
Liquor Antisepticus.	Liq. Thymol Co., B.P.C.
Liquor Antisepticus Chirurgicæ.	Liq. Chloroxylenol, B.P.C.
Liquor Arsenici Hydro- chloricus.	Liq. Arsen. Acid., B.P.C.
Liquor Arsenii Bromidi.	Liq. Pot. Arsen. et Brom., B.P.C.
Liquor Auri et Arsenii Bromidi.	Liq. Aur. et Arsen. Brominat., B.P.C.
Liquor Auri Bromidi Arsenatus.	Liq. Aur. et Arsen. Brominat., B.P.C.
Liquor Bismuthi.	Liq. Bism. et Ammon. Cit., B.P.C.
Liquor Bromochloral Compositus.	Liquor Bromidi Compositus, B.P.C.
Liquor Calcis.	Liquor Calcii Hydroxidi, B.P.
Liquor Calcis Saccharatus. .	Liq. Calc. Hydrox. Sacch., B.P.C.
Liquor Cinchonæ.	Liquid Extract of Cinchona.
Liquor Collodii Co.	Salicylic Collodion.
Liquor Ergotæ.	Liquid Extract of Ergot.
Liquor Ficorum Dulcis.	Compound Syrup of Figs.
Liquor Flavus.	Liq. Tartrazin. Co., B.P.C.
Liquor Fowleri.	Liquor Arsenicalis, B.P.
Liquor Glonoini.	Solution of Glyceryl Trinitrate.
Liquor Halleri.	Sulphuric Acid 1, Alcohol 3, by weight.
Liquor Hydrargyri Bichl.	Solution of Mercuric Chloride.
Liquor Hydrogenii Dioxidii. .	Solution of Hydrogen Peroxide.
Liquor Mindererei.	Dilute Solution of Ammonium Acetate.
Liquor Pancreatis.	Liquor Pancreatini, B.P.C.
Liquor Pituitarii.	Pituitary (Posterior Lobe) Extract.
Liquor Plumbi.	Liq. Plumb. Subacet. Dil., B.P.
Liquor Plumbi Diacetatis. .	Liq. Plumb. Subacet. Fort., B.P.
Liquor Plumbi Fortis.	Liq. Plumb. Subacet. Fort., B.P.
Liquor Potassæ.	Liquor Potassii Hydroxidi, B.P.
Liquor Potassii Carbolatis Compositus.	Liq. Pot. Phenat. Co., B.P.C.
Liquor Ruber.	Liquor Azorubri, B.P.C.
Liquor Schobettii.	Solution of Acid Phosphate of Iron.
Liquor Secretini.	Duodenal Solution.
Liquor Sennæ Leguminorum Dulcis.	Elixir Sennæ, B.P.C.
Liquor Seriparus.	Rennet Solution.
Liquor Sodæ Chloratæ.	Solution of Chlorinated Soda.
Liquor Sterilisans.	Liq. Boracis et Formaldehyde, N.W.F.
Liquor Stypticus.	Solution of Ferric Chloride.
Liquor pro Syrupo Papaveris.	Ext. Papav. Liq., B.P.C.

† Other formulæ are in use.

Liquor Trinitrini.	Solution of Glyceryl Trinitrate.
Liquor Volat. Cornu Cervi.	Solution of Ammonia (<i>approx.</i>).
Liquorice Juice.	Extract of Liquorice in Sticks.
Lister's Salt.	Mercury and Zinc Cyanide.
Litharge.	Monoxide of Lead.
Lithia Water.	Aerated Solution of Lithium Carbonate.
Little Liver Pills.	Compound Aloin and Podophyllin Pills (<i>approx.</i>).
Liver of Antimony.	Sulphurated Antimony.
Liver of Sulphur.	Sulphurated Potash.
Lixivium Saponarium.	Solution of Caustic Potash.
Löffler's Paint.	Pig. Menthol. et Toluén., B.P.C.
Logwood.	Hæmatoxylinum.
Lohock.	Linctus.
Lomholt's Ointment.	Ung. Potass. Polysulph., B.P.C.
Lotio Calcis Sulphuratæ.	Liquor Calcis Sulphuratæ, B.P.C.
Lotio Crinalis.	Lot. Ol. Amygdal. Ammon., B.P.C.
Lotio Emolliens.	Lotio Tragacanthæ, B.P.C.
Lotio Flava.	Yellow Mercurial Lotion.
Lotio Nigra.	Black Mercurial Lotion.
Lotio Plumbi.	Liq. Plumb. Subacet. Dil., B.P.
Lotio Resorcinolis Composita.	Spiritus Resorcinolis, B.P.C.
Lotio Rubra.	Lot. Zinc. Sulph.
Lotio Zinci Sulphidi.	Lot. Potass. Sulphurat., B.P.C.
Lowe nthal's Serum.	Goat Serum.
Loxa Bark.	Pale Cinchona Bark.
Lucca ^a Oil.	Olive Oil.
Luctin*.	Carob Gum.
Lugo's Powder.	Cinchona Bark in Powder.
Lugol's Solution.	Liquor Iodi Aquosus, B.P.
Luminal*.	Phenobarbitone.
Luminal Sodium*.	Soluble Phenobarbitone.
Lunar Caustic.	Silver Nitrate.
Lunargen*.	Mild Silver Proteinate.
Lund's Oil.	Oleum Lubricans, B.P.C.
Luteostab*.	Progesterone.
Lutren*.	Progesterone.
Lycine.	Betaine.
Lycopodium Hungaricum.	Pine Pollen from Hungary.
Lytta.	Cantharides.
M. & B. 693*.	Sulphapyridine.
Mace.	Arillus of the Nutmeg.
Mace Butter.	Expressed Oil of Nutmeg.
Macquer's Salt.	Potassium Arsenate.
Madar.	Calotropis.
Madder.	Root of <i>Rubia tinctorum</i> .
Madweed.	Scutellaria.
Magisal*.	Magnesium Acetylsalicylate.
Magisterium Bismuthi.	Bismuth Subnitrate.
Magistry of Lead.	White Lead.

Magistery of Sulphur	Precipitated Sulphur.
Magma Bismuthi	Mist. Bism. Hydrox., B.P.C.
Magnesia	Light Magnesium Oxide.
Magnesia, Calcined	Light Magnesium Oxide.
Magnesia Mixture	Test Solution of Magnesium Ammonio-sulphate.
Magnesia Usta	Light Magnesium Oxide.
Magnesite	Magnesium Carbonate Rock.
Magsorbent*	Magnesium Trisilicate.
Magsyn*	Magnesium Acetylsalicylate.
Mahua	Bassia.
Ma-Huang	Ephedra.
Mahura	Bael.
Maize Starch	Corn Starch.
Malabar Nut Leaves	Adhatoda.
Malachite	Native Copper Carbonate.
Malacorium	Pomegranate Rind.
Male Fern	Filix Mas.
Male Jalap	Ipomœa.
Malonal	Barbitone.
Malonurea	Barbitone.
Malourea	Barbitone.
Malthusian Cones	Quinine Pessaries.
Maltine (French)	Diastring.
Maltine*	Extract of Malt.
Mancona Bark	Sassy Bark.
Mandecal*	Calcium Mandelate.
Mandl's Paint	Pig. Iod. Co., B.P.C.
Mandrake (<i>Am.</i>)	<i>Podophyllum peltatum</i> .
Mandrake (<i>Eng.</i>)	<i>Bryonia dioica</i> .
Manetel*	Extract of Spinal Cord.
Manila Copal	Dammar.
Manila Elemi	Elemi.
Manna, Alhagi	From <i>Alhagi maurorum</i> .
Manna, Briancon	From <i>Larix Europœa</i> .
Manna Metallorum	Calomel.
Manna, Oak	From <i>Quercus Vallerona</i> and <i>Q. persica</i> .
Manna Tamarisk	From <i>Tamaris gallica</i> var. <i>manifera</i> .
Mannitol Hexanitrate	Mannitol Hexanitrate.
Manuol*	Sodium or Calcium Alginate.
Marcasita	Bismuth.
Marcussen's Ointment	Ung. Potass. Polysulph., B.P.C.
Margosa Bark	Azadirachta.
Marihuana	Cannabis.
Marigold	Calendula.
Marron d'Inde	Horse Chestnut.
Marseilles Soap	Olive Oil Soap.
Marshall Hall's Pills	Aloes, Extract of Liquorice, Hard Soap and Treacle, of each 1 gr.
Marshmallow	Althœa.
Martial Æthiops	Magnetic Oxide of Iron.
Marylebone Cream	Emulsio Olei Arachis, B.P.C.

Massa Ferri Carbonatis.....	Pil. Ferri Carbonatis, B.P.
Massa Kaolini.....	Unguentum Kaolini, B.P.C.
Massicot.....	Lead Oxide.
Maw Seeds.....	Black Poppy Seeds.
May Apple Root.....	Podophyllum.
Maytee.....	Fœnugreek.
Meadow Saffron.....	Colchicum.
Mechoacan Noir.....	Jalap.
Meconium.....	Opium.
Medicated Wound Dressings.	Standard Dressings Nos. 8 and 9.
Medicinal Glucose, Anhydrous	Dextrose.
Medinal*.....	Soluble Barbitone.
Meglin's Pills.....	Hyoscyamus Extract, Valerian Extract, Zinc Oxide, each 1 gr.
Mel Acetatum.....	Oxymel.
Mel Ægyptiacum.....	Verdigris 4·5, Vinegar 32, Honey 63·5
Mel Despumatum.....	Purified Honey.
Mel Scillæ.....	Oxymel of Squill.
Melampodium.....	<i>Helleborus niger</i> .
Mellago Taraxaci.....	Liquid Extract of Taraxacum.
Meloe Vesicatorius.....	Cantharides.
Menformon*.....	Preparations of Œstrone.
Mercurgan.....	Mersalyl.
Mercurial Cream.....	Injecto Hydrargyri, B.P.
Mercuric Imidosuccinate...	Mercury Succinimide.
Mercuric Iodide.....	Red Mercuric Iodide.
Mercuric Nitrate Drops.....	Pig. Hydrarg. Nit., B.P.C.
Mercuric Oxide.....	Red Mercuric Oxide.
Mercuric Sulphate.....	Hydrargyri Persulphas.
Mercuric-ammonium Chloride	Ammoniated Mercury.
Mercuris Corrosivus Albus...	Mercuric Chloride.
Mercuris Dulcis Præcipitatus.	Calomel.
Mercuris Sublimatus Corrosi- vus.....	Mercuric Chloride.
Mercurocol*.....	Mercurochrome.
Mercurome*.....	Mercurochrome.
Mercury Bichloride.....	Mercuric Chloride.
Mercury Oxysulphate.....	Hydrargyri Subsulphas Flavus.
Mercury Tannate.....	Mercurous Tannate.
Merfenil*.....	Phenylmercuric Nitrate.
Merthiolate*.....	Sodium Ethylmercurithiosalicylate.
Mescal Buttons.....	Seeds of <i>Anhalonium Lewinii</i> .
Meta*.....	Compressed Metaldehyde.
Meta-dihydroxybenzene.....	Resorcinol.
Metaphosphoric Acid.....	Glacial Phosphoric Acid.
Metaphyllin.....	Theophylline with Ethylenediamine.
Metarsenobillon*.....	Sulpharsphenamine.
Metasulphite of Potash.....	Potassium Metabisulphite.
Metchnikoff's Calomel Oint- ment.....	Strong Calomel Ointment (1 in 4).
Methanol.....	Methyl Alcohol.
Methenamina.....	Hexamine.

Methoxybenzaldehyde.....	Vanillin.
Methyl Aldehyde Solution...	Formaldehyde Solution.
Methyl Disodium Arsinat.....	Sodium Metharsinite.
Methyl Phenol.....	Cresol.
Methyl-Aspriodine*.....	Methyl Acetylodosalicylate.
Methylbenzene.....	Toluene.
Methyl-benzoylcegonine.....	Cocaine.
Methylcephæline.....	Emetine.
Methylhydroxybenzene.....	Cresol.
Methyl-morphine.....	Codeine.
Methyl-phenyl-acetamide....	Methylacetanilide.
Methyl-rospaniline.....	Crystal Violet.
Methylsulfonyl.....	Methylsulphonyl.
Methyltheobromine.....	Caffeine.
Metramine*.....	Hexamine.
Metrazol.....	Leptazol.
Mexican Scammony Root....	Ipomœa.
Mexican Tea.....	<i>Chenopodium ambrosioides</i> .
Mexico Seeds.....	Castor Oil Seeds.
Microcosmic Salt.....	Sodium Ammonium Phosphate.
Mild Protargin.....	Mild Silver Proteinat.
Milk of Almonds.....	Almond Mixture.
Milk of Lime.....	Slaked Lime and Water in a thin Cream.
Milk of Roses.....	Lotio Rosæ, B.P.C.
Milk of Sulphur.....	Precipitated Sulphur.
Mindererus Spirit.....	Liquor Ammonii Acetatis Dilutus, B.P.
Mineral Solution.....	Arsenical Solution.
Mineral Syrup.....	Liquid Paraffin.
Minium.....	Red Lead.
Mint.....	Spearmint.
Miscible Liquid Extract of Coca	Ext. Coca Liq., B.P.C.
Mistletoe (<i>Am.</i>).....	<i>Phoradendron flavescens</i> .
Mistletoe (<i>Eng.</i>).....	<i>Viscum album</i> .
Mistura Ammon. Acet.....	Dilute Solution of Ammonium Acetate.
Mistura Amygdalæ Amaræ..	Lot. Amygdal. Amar., B.P.C.
Mistura Bromoformi Com- posita.....	Elixir Bromoformi, B.P.C.
Mistura Camphoræ.....	Camphor Water.
Mistura Carminativa.....	Mist. Sod. Bicarb. Aromat.
Mistura Cretacea.....	Chalk Mixture.
Mistura Diaphoretica.....	Mist. Ammon. Acet. Co.
Mistura Diuretica.....	Mist. Pot. Acet. Co.
Mistura Expectorans Nigra..	Mist. Ammon. et Ipecac. Co.
Mistura Expectorans.....	Mist. Ipecac. Co., B.P.C.
Mistura Gentianæ cum Soda.	Mistura Gentianæ Alkalina.
Mistura Laxativa.....	Mixture of Cascara.
Mistura Mag. Carb. Aromat..	Mist. Sod. Bicarb. Aromat.
Mistura Salina.....	Mist. Ammon. Acet. Co.
Mistura Salina Aperiens.....	Mistura Alba.
Mistura Sennæ Co. sine Am- monia.....	Inf. Senn. Co.

Mistura Tussi Rubra.....	Mist. Chlorof. Co.
Mistura Tussi Sedativa.....	Mist. Chlorof. Co.
Mistura Tussis	Mist. Ammon. et Ipecac. Co.
Mitigal*.....	Mesulphen.
Molasses	Treacle.
Momordicin	Elaterin.
Monazite.....	Natural phosphates of the cerium group of rare earths.
Monkshood.....	Aconite Leaf.
Monobrom-Camphor	Camphor Monobromide.
Monochlorethane.....	Ethyl Chloride.
Monochlormethane	Methyl Chloride.
Monoethylmorphine Hydro- chloride.....	Ethylmorphine Hydrochloride.
Monoglycerylphosphoric Acid	Glycerophosphoric Acid.
Monophenylamine.....	Aniline.
Monopotassium Orthophos- phate	Potassium Biphosphate.
Monosodium Orthophosphate	Sodium Biphosphate.
Monseil's Salt	Ferric Subsulphate.
Montreal Potash.....	Commercial Pot. Carb.
Moore's Ointment.....	Colophony Ointment (<i>approx.</i>).
Morammin*.....	Ethanolamine Morrhuate Solution.
Moranyl.....	A complex organic urea for intravenous injection in trypanosomiasis.
Morestin's Fluid.....	Formaldehyde Solution, Glycerin, and Alcohol, equal parts.
Morison's Paste	Past. Mag. Sulph., B.P.C.
Moro's Ointment	Tuberculin Ointment, Diagnostic.
Morphiæ Murias	Morphine Hydrochloride.
Morphosan	Morphine Methylbromide.
Mort (or Morte).....	Fresh Lard.
Morton's Fluid.....	Iodine 10 gr., Potassium Iodide 30 gr., Water 25 m., Glycerin to 1 oz.
Moryl*	Carbachol.
Mountain Tea.....	Gaultheria.
Mountain Tobacco	Arnica.
Mouse's Ear	Syrup of Horehound.
Mowra(h)	Bassia.
Mucilago Chondri	Decoctum Chondri, B.P.C.
Mudar	Calotropis.
Mukta-jhuri	Acalypha.
Muriate	Chloride or Hydrochloride.
Muriate of Antimony	Solution of Antimonious Chloride.
Muriate of Soda.....	Sodium Chloride.
Muriatic Acid.....	Hydrochloric Acid.
Muriatic Ether.....	Ethyl Chloride.
Muscovite	Ruby mica.
Mushroom Sugar.....	Mannite.
Musk Root.....	Sumbul.
Mustard Bran.....	Seed coats of Black Mustard.

Mustard Flour	Powdered black and white mustard seeds.
Muthu's Inhalants	Compound Formaldehyde Sprays.
Mydriazine	Atropine Methylbromide.
Myosalvarsan*	Sulpharsphenamine.
Myristicæ Adeps	Expressed Oil of Nutmeg.
Myristicæ Nuclei	Nutmegs.
N.A.B.	Neoarsphenamine.
Naphtha Aceti	Acetic Ether.
Naphtha Vitroli	Ether.
Naphthol	Betanaphthol.
Naphthol Benzoate	Betanaphthyl Benzoate.
Nargol*	Silver Nucleinate.
Naso-Pharyngeal Solution- Tablets	Solv. Borac. et Benamin. Co., B.P.C.
Nataloin	Aloin from Natal Aloes.
Natron or Natrum	Sodium Carbonate.
Natron Vitriolatum	Sodium Sulphate.
Neapolitan Ointment	Mercury Ointment.
Neatsfoot Oil	Fixed Oil obtained by boiling Ox or Cow Feet in Water.
Neatsfoot Oil, Factitious.	Lard 1, Colza Oil 3.
Nebula	A Spray.
Nebula Thymolis Composita ..	Neb. Eucalypt. Co., B.P.C.
Nectandra Bark	Bebeeru Bark.
Neem Bark	Azadirachta.
Nembutal*	Sodium Ethylmethylbutylbarbiturate.
Neoarsphenolamine	Neoarsphenamine.
Neocinchophen*	Ethyl Methylcinchoninate.
Neoform	Bismuth Tri-iodophenol.
Neo-Hepatex*	Liver Extract Injection.
Neo-Hornbreol*	Testosterone Propionate.
Neo-Hydriol*	Iodised Oil.
Neokharsivan*	Neoarsphenamine.
Neophenoquin*	Lithium Phenylcinchoninate.
Neoquinophan	Neocinchophen.
Neosalvarsan*	Neoarsphenamine.
Nepenthe*	Liquid preparation of Opium.
Nerve Oil	Neatsfoot Oil.
Nesbit's Specific	Compound Spirit of Santal.
Nessler's Reagent	Solution of Potassio-mercuric Iodide.
Neutral Acriflavine	Euflavine.
Neutral Calcium Phosphate ..	Calcium Phosphate, B.P.
Neutral Tartar	Potassium Tartrate.
Neutralon*	Synthetic Aluminium Sodium Silicate.
Neutroflavin	Euflavine.
New Zealand Dammar	Kauri Resin.
Nicamide*	Nikethamide.
Niccolum	Nickel.

Niemeyer's Pill.....	Pilulæ Digitalis Compositæ, B.P.C. (but also <i>Syn. Heim's Pill, q.v.</i>).
Nil, Nihil, Nihili Album.....	Zinc Oxide.
Nim.....	Azadirachta.
Nitre.....	Potassium Nitrate.
Nitre Paper.....	Charta Nitratæ, B.P.C.
Nitric Oxide of Mercury.....	Red Mercuric Oxide.
Nitrobenzol.....	Nitrobenzene.
Nitro-erythrite.....	Erythrol Tetranitrate.
Nitromannite.....	Mannitol Nitrate.
Nitrous Ether.....	Ethyl Nitrite.
Nitrum Tabulatum.....	Nitre Balls.
Nitrum Vitriolatum.....	Potassium Sulphate.
Nizin*.....	Zinc Sulphanilate.
Nordhausen Sulphuric Acid..	Fuming Sulphuric Acid.
Norit*.....	Activated Charcoal.
Norwegian Tar.....	Tar.
Novarsan*.....	Neoarsphenamine.
Novarsenobenzene.....	Neoarsphenamine.
Novarsenobenzol.....	Neoarsphenamine.
Novarsenobillon*.....	Neoarsphenamine.
Novasorb*.....	Synthetic Magnesium Trisilicate.
Novatophan*.....	Methyl Phenylcinchoninate.
Novocain*.....	Procaine Hydrochloride.
Novostab*.....	Neoarsphenamine.
Nuclein.....	Nucleic Acid.
Nucleinic Acid.....	Nucleic Acid.
Nucleotin-phosphoric Acid..	Thyminic Acid.
Numoquin.....	Ethylhydrocupreine.
Nursery Hair Lotion.....	Lotio Staphisagriæ, B.P.C.
Nut Oil.....	Arachis Oil.
Nutgall.....	Gall.
Nutmeg Butter.....	Expressed Oil of Nutmeg.
Nux Aromatica.....	Nutmeg.
Nux Moschata.....	Nutmeg.
OAK AGARIC.....	Amadou (<i>Polyporus fomentarius</i>).
Obiturin.....	Sodium Fluorescein.
Ochre.....	Native Ferric Oxide.
Œstroform*.....	Preparations of Œstradiol Benzoate
Œstroglandol*.....	Œstrone.
Oil of Adders.....	See Oil of Vipers.
Oil of Allspice.....	Oil of Pimento.
Oil of Aloes.....	Oil obtained from Socotrine Aloes.
Oil of Amber, Factitious.....	Oil distilled from Copal or Dammar.
Oil of American Wormseed..	Oil of Chenopodium.
Oil of Asarabacca.....	Oil obtained from Root of <i>Asarum europæum</i> .
Oil of Balm.....	Volatile Oil from <i>Melissa officinalis</i> .
Oil of Bay Berries.....	Oil expressed from Berries of <i>Laurus nobilis</i> .

Oil of Ben	Oil expressed from Seeds of <i>Moringa aptera</i> .
Oil of Benjamin	Oil obtained from Benzoin, after sublimation of Benzoic Acid.
Oil of Benné	Sesame Oil.
Oil of Birch, Sweet	Volatile Oil from <i>Betula lenta</i> .
Oil of Birch Tar	Empyreumatic Oil from <i>Betula alba</i> .
Oil of Bitter Almonds, Synthetic	Benzaldehyde.
Oil of Bones	Oil obtained by distilling Bones, Horn, etc.
Oil of Box	Oil obtained from Boxwood.
Oil of Bricks	Mixture of Oil of Turpentine 1, and Linseed Oil 4, coloured with Alkanet or Tar.
Oil of Cedrat	Oil obtained from Citron Peel.
Oil of Colza	Rape Oil.
Oil of Cuscut	Oil of <i>Andropogon muricatus</i> .
Oil of Duty	Oil of Rhodium (<i>q.v.</i>).
Oil of Elder	Cabbage Oil (<i>q.v.</i>).
Oil of Exeter	Oil of Elder, mixed with Euphorbium, Mustard, etc.
Oil of Fern	Oil of Male Fern.
Oil of Geranium	Oil obtained from <i>Pelargonium</i> sp.
Oil of Geranium, East Indian or Turkish	Oil of Palmarosa.
Oil of Gingelli	Sesame Oil.
Oil of Grain	Fusel Oil (<i>q.v.</i>).
Oil of Green Elder	Oil of Elder.
Oil of Hartshorn	Bone Oil (<i>q.v.</i>).
Oil of Hemlock	Olive Oil in which fresh Leaves of <i>Conium maculatum</i> have been digested.
Oil of Jupiter	Oil of Juniper.
Oil of Laurel Berries	Butyraceous Oil, expressed from Berries of <i>Laurus nobilis</i> ,
Oil of Liquid Pitch	Oil of Tar.
Oil of Mace	Expressed Oil of Nutmeg (<i>approx.</i>).
Oil of Male Fern	Extract of Male Fern.
Oil of Man	Bone Oil.
Oil of Mirbane	Nitrobenzene.
Oil of Mucilages	Olive Oil boiled with Decoction of Marshmallow Root, Linseed, and Fœnugreek.
Oil of Nerves	Neatsfoot Oil.
Oil of Niobe	Methyl Benzoate.
Oil of Orange Flowers	Oil of Neroli.
Oil of Palma Christi	Castor Oil.
Oil of Palmarosa	Oil obtained from <i>Cymbopogon Martini</i> .
Oil of Partridge Berry	Oil of Wintergreen.
Oil of Pelargonium	Oil of Geranium.
Oil of Pennyroyal	Oil of Pulegium.

Oil of Peter.....	Rock Oil, or a mixture of Oil of Rosemary 1, Oil of Turpentine 4, and Barbados Tar 4.
Oil of Petitgrain.....	Oil obtained from the leaves, etc., of the Bitter Orange Tree.
Oil of Petre.....	Oil of Peter (<i>q.v.</i>).
Oil of Pine.....	Oil of Siberian Fir (Oleum Abietis).
Oil of Pine, Aromatic.....	Steam-distilled oil from various species of <i>Pinus</i> .
Oil of Pine, Steam-distilled ..	Aromatic Oil of Pine.
Oil of Plum Stones.....	Oil obtained from Plum Kernels.
Oil of Pompilion.....	Ointment of Poplar Buds.
Oil of Portugal.....	Oil of Sweet Orange Peel.
Oil of Ptychotis.....	Oil of Ajowan.
Oil of Red Cedar.....	Cedar Wood Oil.
Oil of Rhodium.....	Oil obtained from Root of <i>Genista canariensis</i> .
Oil of Rhodium, Factitious...	Mixture of Sandal Wood Oil and Otto of Rose or Oil of Rose Geranium.
Oil of Spike.....	Volatile Oil from <i>Lavandula latifolia</i> .
Oil of Spike, Factitious.....	Mixture of Lavender Oil and Oil of Turpentine, coloured with Alkanet.
Oil of St. John.....	Oil of Elder (<i>approx.</i>).
Oil of St. John's Wort.....	A red oil obtained by digesting the flowering tops of <i>Hypericum perforatum</i> in warm Olive Oil.
Oil of Swallows.....	Oil of Elder.
Oil of Sweet Flag.....	Oil obtained from Rhizome of <i>Acorus Calamus</i> .
Oil of Tar, Light.....	First Fraction of Distillate of Wood Tar.
Oil of Tartar.....	Deliquesced Potassium Carbonate.
Oil of Tea.....	Oil obtained from Seeds of <i>Camellia</i> sp.
Oil of Three Ingredients.....	Mixture of the Oils of Turpentine, Lavender, and Bricks, in equal parts.
Oil of Verbena, Factitious ...	Oil of Lemon Grass.
Oil of Verbena, Indian.....	Oil of Lemon Grass.
Oil of Vetiver.....	Oil of Cuscus.
Oil of Vipers.....	The fat or oil of the Viper or Adder.
Oil of Vitriol.....	Sulphuric Acid.
Oil of Walnuts.....	Oil obtained from Walnuts.
Oil of Wax.....	Oil obtained from Beeswax.
Oil of White Birch.....	Birch Tar Oil.
Oil of Wintergreen.....	Oil of Sweet Birch.
Oil of Wormseed.....	Oil of Chenopodium.
Oil of Wormwood.....	Oil obtained from <i>Artemisia Absinthium</i> .
Ointment of Mercuric Iodide.	Ung. Hydrarg. Iod. Rub., B.P.C.
Okistypin*.....	Cotarnine Chloride.
Old Tuberculin.....	Tuberculinum Pristinum, B.P.
Old Woman.....	<i>Artemisia Absinthium</i> .
Olefant Gas.....	Ethylene.
Oleoresina Aspidii.....	Extract of Male Fern.

Oleum	Fuming Sulphuric Acid.
Oleum Ammoniatum	Liniment of Ammonia.
Oleum Amygdalæ Persic.	Expressed Oil of Apricot (or Peach) Kernels.
Oleum Anthos	Oil of Rosemary.
Oleum Aurantii Florum	Oil of Neroli.
Oleum Badiani	Oil of Star Anise.
Oleum Betulæ Albæ	Birch Tar Oil.
Oleum Betulæ Lentæ	Oil of Sweet Birch.
Oleum Betulæ Pyroligneum ..	Birch Tar Oil.
Oleum Betulæ Volatile	Oil of Sweet Birch.
Oleum Bubulum	Neatsfoot Oil.
Oleum Camphoræ Essentiale ..	Rectified Oil of Camphor.
Oleum Camphoratum	Liniment of Camphor.
Oleum Cetacei	Sperm Oil.
Oleum Chloroformi	Chloroform 3, Olive Oil 2.
Oleum Cinereum	Injectio Hydrargyri Fortis, B.P.C.
Oleum Cocainæ	Cocaine 1, Almond Oil 49.
Oleum Cocos Nuciferæ	Coconut Oil.
Oleum Cocos Raffinatum	Coconut Oil.
Oleum Cornu Cervini	Bone Oil (<i>q.v.</i>).
Oleum Fagi Pyroligneum	Oil of Beech Tar.
Oleum Filicis Maris	Extract of Male Fern.
Oleum Gadus Morrhuae	Cod-liver Oil.
Oleum Iodatum	Iodised Oil.
Oleum Jecoris Aselli	Cod-liver Oil.
Oleum Junip. Empyreumat.	Oil of Cade.
Oleum Junip. Oxycedri	Oil of Cade.
Oleum Junip. Pyroligneum	Oil of Cade.
Oleum Kervinum	Castor Oil.
Oleum Lateritium	Oil of Bricks.
Oleum Lauri Essent.	Oil of Bay.
Oleum Limetta	Oil of Limes.
Oleum Linanthracis	Coal Tar.
Oleum Lini cum Calce	Carron Oil.
Oleum Macis	Expressed Oil of Nutmeg.
Oleum Melaleucæ	Oil of Cajuput.
Oleum Menthæ	Oil of Spearmint.
Oleum Menthæ Crispæ	Oil of Spearmint.
Oleum Moschatæ	Expressed Oil of Mace.
Oleum Nervum	Neatsfoot Oil.
Oleum Niaouli	Oil of <i>Melaleuca Viridiflora</i> .
Oleum Nucis	Arachis Oil.
Oleum Nucistæ	Expressed Oil of Nutmeg.
Oleum Palmarosæ	Oil of <i>Cymbopogon Martini</i> .
Oleum Petræ	Oil of Peter (<i>q.v.</i>).
Oleum Petrolatum	Liquid Paraffin.
Oleum Pimpinellæ	Oil of Aniseed.
Oleum Pini	Oil of Siberian Fir (Oleum Abietis).
Oleum Populi	Olive oil in which the buds of <i>Populus</i> <i>balsamiferus</i> have been digested.
Oleum Rusci	Birch Tar Oil, from <i>Betula alba</i> .

Oleum Stechadis	Oil of Spike Lavender.
Oleum Sulphuratum	Balsam of Sulphur (<i>q.v.</i>).
Oleum Tiglii	Croton Oil.
Oleum Viride	Oil of Elder.
Omnopon*	Papaveretum.
Onguent Napolitain	Mercury 1, Benzoinated Lard 1.
Opacin*	Iodophthalein.
Opiate Linctus of Squill	Linct. Scill. Co., B.P.C.
Opium Colatum	Extract of Opium.
Opium Concentratum	Papaveretum, B.P.C.
Opodeldoc	Liniment of Soap.
Opodeldoc, Arnica	Linimentum Arnicæ, B.P.C.
Opodeldoc, Solid	Lin. Sap. Camph., B.P.C.
Opoidine*	Papaveretum.
Optochin*	Ethylhydrocypreine.
Orchil	Archil.
Ordeal Bark	Erythrophloeum.
Ordeal Beans	Calabar Bean.
Organs	Pennyroyal.
Organy	Pennyroyal; also Origanum.
Orizaba Jalap Root	Ipomœa.
Orizabin	Scammonin.
Orleana	Annatto.
Orpiment	Yellow Arsenic Sulphide.
Ortho-bromo-Camphor	Camphor Monobromide.
Orthodioxibenzene	Catechol.
Orthoform*	Orthocaine.
Ortho-oxycinnamic Acid	Coumarin.
Orthophosphoric Acid	Concentrated Phosphoric Acid.
Oryza	Rice.
Os Ustum	Calcium Phosphate.
Osmo Kaolin*	Kaolin.
Otto of Rose	Oil of Rose.
Ourari	Curare.
Ouricury Wax	Leaf wax of Carnauba type.
Ouripado	Impure Carnauba-like Wax.
Ovi Albumen	White of Egg.
Ovi Vitellus	Yolk of Egg.
Ovobrol*	Ovarian-Bromide preparation.
Ovostab*	Estrone.
Ox Gall	Ox Bile.
Oxycarbonate of Bismuth	Bismuth Carbonate.
Oxygenated Oil	Olive Oil through which Chlorine has been passed for several days.
Oxygenated Paraffin	Parogen, B.P.C.
Oxygenated Tooth Powder ..	Magnesium Peroxide with Chalk.
Oxyhæmoglobin	Hæmoglobin.
Oxylan*	Diphenan.
Oxylith	Sodium Peroxide.
Oxymel Æruginis	Linimentum Æruginis.
Oxymel Simplex	Oxymel.
Oxymuriate	Chlorate.

Oxymuriate of Soda	Solution of Chlorinated Soda.
Oxynitrate	Subnitrate.
Oxyquinoline Sulphate	Potassium Hydroxyquinoline Sulphate.
Ozonic Ether	Ethereal Solution of Hydrogen Peroxide.
P.M.B. 444*	Methylcellulose derivative.
Pabestol*	Stilbæstrol.
Pagenstecher's Ointment	Yellow Mercuric Oxide (4 per cent.) in Yellow Soft Paraffin.
Palas-papra	Butea Seed.
Palm Butter	Palm Oil.
Palm Spirit	A brandy prepared from rice, cane sugar and coconuts.
Palma Christi	<i>Ricinus communis</i> .
Panama Bark	Quillaia.
Panama Bismuth	Bismuth Subnitrate.
Panchymagogum Minerale	Calomel.
Pansecretin	Secretin.
Papayotin	Papain.
Papoose Root	Caulophyllum.
Paracelsus's Elixir of Propriety	Tinctura Aloes et Myrrhæ, B.P.C.
Paracoto	Coto.
Paracresylol	Cresol.
Paraffinum Liquidum pro Nebulis	Light Liquid Paraffin.
Paraform	Paraformaldehyde.
Paraguay Tea	Maté.
Parathormone*	Solution of the active principles of the Parathyroid.
Paregoric	Tinctura Opii Camphorata, B.P.
Paregoric Elixir	Tinctura Opii Camphorata, B.P.
Parenamps*	Liver Extract Injection.
Paré's Ointment	Ointment containing finely powdered Lead Amalgam.
Paris Black	Bone Black.
Paris Green	Copper Aceto-arsenite.
Paris Red	Vermilion.
Parogen Cold Cream	White Rose Ointment (<i>approx.</i>).
Parogen Liquid	Parogenum, B.P.C.
Parogen, Thick	Hard Paraffin 6, Liquid Paraffin 24, Oleic Acid 15, Ammoniated Alcohol (10 per cent.) 5.
Paroidin*	Standardised Parathyroid Extract.
Parrish's Food	Syr. Ferr. Phosph. Co., B.P.
Pasque Flower	Pulsatilla.
Passulæ	Raisins.
Pasta Analgesica	Compound Methyl Salicylate Ointment (<i>approx.</i>).
Pasta Bixæ	Annatto.
Pasta Caustica	Vienna Paste.
Pasta Gummi	Marshmallow Paste.

Pasta Iodi et Picis	Pig. Ol. Pic. c. Iod., B.P.C.
Pasta Londinensis	Caustic Soda 1, Calcium Oxide 1, Water <i>q.s.</i>
Pasta Zinci et Ichthammolis..	Gelat. Zinc. et Ichtham., B.P.C.
Pastilles de Reglisse.....	Liquorice Pastilles.
Pâte de Guimauve.....	Marshmallow Paste.
Patent Mixture.....	Mist. Æther. c. Ammon., B.P.C., or similar mixture.
Paullinia	Guarana.
Pavopin*.....	Papaveretum.
Peach Kernel Oil.....	Persic Oil.
Peachwood	Brazil Wood.
Peacock's Stomachic Mixture	Compound Soda Mixture.
Pea-nut Oil.....	Arachis Oil.
Pear Oil.....	Amyl Acetate.
Pearl Ash.....	Potassium Carbonate.
Pearl-white	Blanc de Perle.
Pearson's Arsenical Solution.	See under Liquor Sodii Arsenatis in the B.P.C. 1923.
Pearson's Cerate.....	Lead Plaster 50, Yellow Beeswax 12·5, Almond Oil 37·5.
Pectoral Powder.....	Compound Liquorice Powder.
Pellitory Root.....	Pyrethrum Root.
Pelonin*.....	Nicotinic Acid.
Pelosine.....	Beberine.
Pennyroyal	Pulegium.
Pepo.....	Melon Pumpkin Seeds.
Pepper Bark.....	Winter's Bark.
Pepsac*.....	Desiccated Stomach.
Peptone Paste.....	Beef Peptone.
Peptone Suppository.....	Suppositorium Nutriens, B.P.C.
Peptonised Iron Solution	Liquor Ferri Peptonatis, B.P.C.
Peptonising Powder.....	Pulv. Pancreatini Co., B.P.C.
Peptonising Tablets.....	Tab. Pancreatini, B.P.C.
Per-Abrodil*.....	Diodone.
Perchloroethylene.....	Tetrachlorethylene.
Perhepar*.....	Liver Extract.
Perichthol*.....	Ichthammol.
Pernæmon*.....	Liver Extract Injection.
Perosmic Acid.....	Osmic Acid.
Persian Balsam.....	Compound Tincture of Benzoin.
Persian Powder.....	Powdered Pyrethrum Flowers.
Persulphate of Copper.....	Copper Sulphate.
Pertussis Vaccine.....	Whooping Cough Vaccine.
Peruvian Bark.....	Cinchona.
Petit's Liquor.....	Glycerin 333, Distilled Water 146, Alcohol (95 per cent.) 580.
Peter's Drops	Compound Tincture of Benzoin with a little Oil of Origanum.
Petrolatum.....	Soft Paraffin.
Petroleum Barbadosense.....	Barbados Tar.
Petroleum Ether.....	Light Petroleum.

Petroleum Jelly.....	Soft Paraffin.
Petroleum Naphtha.....	Ligroin.
Petroleum, Stockholm.....	Tar.
Petty Spurge.....	Euphorbia Peplus.
Pharbitis Seeds.....	Kaladana.
Pharbitisin.....	Kaladana Resin.
Phanodorm*.....	Cyclobarbitone.
Phenamine.....	Phenocoll Hydrochloride.
Phenic Acid.....	Phenol.
Phenic Alcohol.....	Phenol.
Phenobarbital.....	Phenobarbitone.
Phenol Soda.....	Liq. Sod. Phenat. Co., B.P.C.
Phenol-Bismuth.....	Bismuth Phenate.
Phenoquin*.....	Cinchophen.
Phenyl Hydrate.....	Phenol.
Phenylacetamide.....	Acetanilide.
Phenylacrylic Acid.....	Cinnamic Acid.
Phenylamine.....	Aniline.
Phenylethylmalonylurea.....	Phenobarbitone.
Phenyl-methyl-ketone.....	Acetophenone.
Philosophers' Wool.....	Zinc Oxide.
Phlogopite.....	Amber Mica.
Phlorizin.....	Phloridzin.
Phloroglucin.....	Phloroglucinol.
Phospholutein.....	Lecithin.
Phosphoric Acid, Anhydrous.....	Phosphorus Pentoxide.
Phosphoric Acid, Syrupy.....	Phosphoric Acid.
Phosphoric Anhydride.....	Phosphorus Pentoxide.
Phosphoric Oxide.....	Phosphorus Pentoxide.
Phosphorus Salt.....	Microcosmic Salt.
Phyone.....	Growth hormone of the anterior pituitary.
Pickling Acid.....	Acetic Acid.
Picrasmin.....	Quassin.
Picric Acid.....	Trinitrophenol.
Pigeon Berry.....	Phytolacca.
Pigmentum Cæruleum.....	Pig. Viola Crys. Co., B.P.C.
Pigmentum Iodi Mite.....	Pig. Iodi, B.P.C.
Pigmentum Triplex.....	Pig. Viola Crys. Co., B.P.C.
Pilewort.....	Ficaria.
Pilocarpus.....	Jaborandi.
Pilula Aloes et Coloc.....	Compound Pill of Colocynth.
Pilula Antimonii Co.....	Compound Calomel Pill.
Pilula Asafetidae Composita.....	Compound Pill of Galbanum.
Pilula Calomelanos Composita.....	Compound Calomel Pill.
Pilula Cathartica.....	Compound Pill of Colocynth.
Pilula Cerulea.....	Mercury Pill.
Pilula Cochia.....	Pil. Colocynth. Co., B.P.C.
Pilula Communis.....	Aloes and Myrrh Pill.
Pilula Diaphoretica.....	Compound Calomel Pill.
Pilula Digitalis cum Scilla.....	Pil. Digit. Co., B.P.C.
Pilula Ferri Arsenicales.....	Iron and Arsenic Pill.

Pilula Gummosa.....	Compound Pill of Galbanum.
Pilula Myrrhae Co.....	Compound Pill of Galbanum.
Pilula Opii Co.....	Soap Pill with Opium.
Pilula Phenaloini.....	Pil. Phenolphthal. Co., B.P.C.
Pilula Plummeri.....	Compound Calomel Pill.
Pilula Rudii.....	Compound Pill of Colocynth.
Pilula Rufi.....	Pil. Aloes et Myrrh., B.P.C.
Pilula Trium Phosphatum ..	Pil. Ferr. Phosph. c. Quinin. et Strych., B.P.C.
Pilula Trium Valerianatum ..	Pil. Ferr. Valer. Co., B.P.C.
Pine Oil.....	Oleum Abietis.
Pine Oil, Steam-distilled and Aromatic.....	Volatile Oil from various species of <i>Pinus</i> .
Pink Root.....	Spigelia.
Pinus Bark.....	Hemlock Spruce.
Piper.....	Black Pepper.
Piperonal.....	Heliotropin.
Piperyl-piperidine.....	Piperine.
Pipsissewa.....	Chimaphila.
Pitexan*.....	Pituitary (Anterior Lobe) Extract.
Pitibulin*.....	Pituitary (Posterior Lobe) Extract.
Pitocin*.....	Solution of the oxytocic principle of the posterior pituitary.
Pitoxylin*.....	Pituitary (Posterior Lobe) Extract.
Pitressin*.....	Solution of the pressor principle of the posterior pituitary.
Pituitrin*.....	Pituitary (Posterior Lobe) Extract.
Pix Abietinarum.....	Tar.
Pix Abietina or Alba.....	Burgundy Pitch.
Pix Betula.....	Birch Tar.
Pix Linanthracis.....	Coal Tar.
Pix Mineralis.....	Asphalt.
Pix Pini.....	Tar.
Planadalin*.....	Carbromal.
Planavit A*.....	Vitamin A Solution.
Planavit C*.....	Ascorbic Acid.
Planche's Purgative.....	Scammony, in powder, 6 gr., Milk 2 oz.
Planocaine*.....	Procaine Hydrochloride.
Planochrome*.....	Mercurochrome.
Plasmoquin*.....	Pamaquin.
Plaster of Paris.....	Exsiccated Calcium Sulphate.
Plata Coloidal.....	Colloidal Silver.
Plata Vitellina.....	Mild Silver Proteinate.
Plummer's Pills.....	Pil. Hydrarg. Subchlor. Co., B.P.C.
Pod Pepper.....	Capsicum.
Poison Ivy.....	<i>Rhus toxicodendron</i> .
Poison Nut.....	<i>Nux Vomica</i> .
Poison Oak.....	<i>Rhus toxicodendron</i> .
Poke Root.....	Phytolacca.
Polishing Crocus.....	Ferric Oxide.
Pollacine*.....	Grass-pollen Vaccine.
Polychrest Salt.....	Potassium Sulphate.

Polychroit	Colouring Matter of Saffron.
Pomatum Saturni	Lead Acetate Ointment.
Pommade en Crème	Cold Cream.
Pompholix	Zinc Oxide.
Pondicherry Oil	Arachis Oil.
Poor Man's Plaster	Emplastrum Picis, B.P.C.
Poore's Pills	Pil. Podoph. et Quinin., B.P.C.
Porcelain Clay	Kaolin.
Portland Arrowroot	Starch from <i>Arum maculatum</i> .
Potash Lozenges	Potassium Chlorate Lozenges.
Potash Pellets	Potassium Chlorate Tablets.
Potash Soap	Sapo Kalinus, B.P.C.
Potash Water	Aerated Solution of Potassium Bi- Carbonate.
Potashes	Crude Potassium Carbonate.
Potassa Caustica	Potassium Hydroxide.
Potassa Fusa	Potassium Hydroxide.
Potassæ Bitartras	Potassium Acid Tartrate.
Potassæ Citras Neutralis	Potassium Citrate.
Potassæ Hydras	Potassium Hydroxide.
Potassæ Hydriodas	Potassium Iodide.
Potassæ Hydrobromas	Potassium Bromide.
Potassæ Prussias Flavus	Potassium Ferrocyanide.
Potassæ Prussias Ruber	Potassium Ferricyanide.
Potassæ Subcarbonas	Potassium Carbonate.
Potassæ Supersulphas	Potassium Bisulphate.
Potassæ Supertartras	Potassium Acid Tartrate.
Potassii Sulphuretum	Sulphurated Potash.
Potassio-tartrate of Iron	Iron and Potassium Tartrate.
Potassium Bismuthyl Tartrate	Bismuth Potassium Tartrate.
Potassium Cyanuret	Potassium Cyanide.
Potassium Diarsenate	Potassium Arsenate.
Potassium Iodo-hydrargyrate	Mercury and Potassium Iodide.
Potassium Metabisulphite	Potassium-Pyrosulphite.
Potassium Oxyquinoline Sulphate	Potassium Hydroxyquinoline Sulphate.
Potassium Pyroborate	Potassium Baborate.
Potassium Tetroxalate	Potassium Quadroxalate.
Potato Drops	Compound Tincture of Aloes.
Potato Oil or Spirit	Crude Amylic Alcohol.
Potio Carbonatis Calcis	Chalk Mixture.
Pottage's Tincture	Tincture of Cimicifuga.
Poudre de Réglisse Composée	Liquorice 1½, Senna 1½, Fennel 1, Sublimed Sulphur 1, Sucrose 5.
Poudre Savory	Seidlitz Powder.
Pounce	Powdered Sandarac.
Præquine*	Pamaquin.
Prassium	Horehound.
Prayer Beads	Seeds of <i>Abrus precatorius</i> .
Precipitated Chalk	Calcii Carbonas.
Pregnyl*	Anterior-pituitary-like hormone from urine of pregnancy.

Preloban*	Extract of anterior lobe of the pituitary gland.
Prepared Chalk	Creta.
Prepared Sulphuret of Antimony	Purified Black Antimony.
Preston Salts	Smelling Salts.
Prickly Ash Bark	Zanthoxylum.
Progesterin	Progesterone.
Progestoral*	Pregneninolone.
Progyon*	Œstradiol Benzoate.
Prokayvit*	Menaphthone.
Prokayvit Oral*	Acetomenaphthone.
Prolactin	Lactogenic principle from anterior pituitary.
Prolan*	Gonadotrophic factor from pregnancy urine.
Proluton*	Progesterone.
Prominal*	Phemitone.
Prontosil Album*	Sulphanilamide.
Prontosil Rubrum*	4 : Sulphonamido-2 : 4-diaminoazobenzene.
Propenyl Alcohol	Glycerin.
Prophylactic Ointment	Ung. Hydrarg. Subchlor. Co., B.P.C.
Protargol*	Silver Protein.
Proseptasine*	p-Benzylaminobenzene-sulphonamide.
Proto-chloride of Mercury	Calomel.
Proto-iodide of Mercury	Green Mercurous Iodide.
Proto-sulphate of Iron	Ferrous Sulphate.
Protoxalate of Iron	Ferrous Oxalate.
Protoxide of Antimony	Antimonious Oxide.
Provence Oil	Finest (Aix) Olive Oil.
Proxy	Hydrogen Peroxide Solution.
Prussian Blue	Ferric Ferrocyanide.
Prussian Powder	Compound Liquorice Powder.
Ptychotis Oil	Ajowan Oil.
Puccoon	<i>Sanguinaria canadensis</i> .
Puchâ Pât	Patchouli.
Pulmentum	Gruel.
Pulsatilla (Am.)	<i>Anemone patens</i> , var. <i>Nuttalliana</i> .
Pulsatilla (Eng.)	<i>Anemone Pulsatilla</i> .
Pulvis Aërophorus Laxans	Seidlitz Powder.
Pulvis Alexiterius	Powder of Ipecacuanha and Opium.
Pulvis Alkalinus Compositus	Pulvis Boracis Compositus, B.P.C.
Pulvis Aloeticus	Aloes and Canella Powder.
Pulvis Antimonii Co.	Antimonial Powder.
Pulvis Antisepticus Solubilis	Pulv. Zinc. Sulph. Co., B.P.C.
Pulvis Aromaticus	Pulv. Cinnam. Co., B.P.C.
Pulvis Basilicus	Compound Calomel Powder.
Pulvis Cardamom. Co.	Compound Cinnamon Powder.
Pulvis Catharticus	Compound Powder of Scammony.
Pulvis pro Collunaris Simplice	Pulv. Borac. Co., B.P.C.
Pulvis Comitessæ	Cinchona Bark in Powder.

Pulvis Cretaceus	Aromatic Powder of Chalk.
Pulvis Digestivus	Pepsin.
Pulvis Duodenalis	Duodenal Membrane.
Pulvis Effervescens Laxans	Seidlitz Powder.
Pulvis Gummosus	Compound Powder of Tragacanth.
Pulvis Ipêcacuanhæ Thebaicus	Powder of Ipecacuanha and Opium.
Pulvis Jacobi	Antimonial Powder.
Pulvis Patrum	Cinchona Bark in Powder.
Pulvis Pectoralis Kurellæ	Pulv. Glycyrrh. Co., B.P.
Pulvis pro Pedibus	Pulv. Acid. Salicyl. Co., B.P.C.
Pulvis Rhei Salinus	Compound Powder of Rhubarb.
Pulvis Sod. Chlor. Co.	Pulv. Borac. Co., B.P.C.
Pulvis Sodæ Tartaratæ Effervescens	Seidlitz Powder.
Pulvis Succ. Papav.	Powdered Opium.
Punicine	Pelletierine.
Purging Agaric	Agaric.
Purging Nuts	Croton Seeds.
Purified Aloes	Extract of Aloes.
Purified Ether	Anæsthetic Ether.
Purified Kieselguhr	Diatomite.
Purified Siliceous Earth	Diatomite.
Purple of Cassius	Gold Stannate.
Pussy-willow Bark	Black Willow Bark.
Putty Powder	Commercial Oxide of Tin.
Pyelosil*	Diodone.
Pylumbrin*	Diodone.
Pyoktanin	Methyl Violet.
Pyraloxin	Oxidised Pyrogallol.
Pyramidon*	Amidopyrine.
Pyridylmethylpyrrolidin	Nicotine.
Pyro	Pyrogallol.
Pyroacetic Spirit	Acetone.
Pyrocatechin	Catechol.
Pyrogallol Oxide	Oxidised Pyrogallol.
Pyroligneous Acid	Crude Acetic Acid.
Pyroligneous Spirit	Wood Naphtha.
Pyrosulphite of Potash	Potassium Metabisulphite.
Pyroxylic Spirit	Wood Naphtha.
QUEBRACHINE	Yohimbine
Quebracho-Blanco	Quebracho.
Queen's Root	Stillingia.
Queensland Fever Bark	Bark of <i>Alstonia constricta</i> .
Quercitron Bark	Bark of <i>Quercus tinctoria</i> .
Quevenne's Iron	Reduced Iron.
Quicklime	Calcium Oxide.
Quicksilver	Mercury.
Quillaic Acid	Saponin.
Quillain	Saponin.
Quinacrine*	Mepacrine Hydrochloride.

Quince Seed.	Cydonia.
Quinetum ...	Mixture of equal parts of Quinine, Cinchonidine, and Cinchonine.
Quinine Acetosalate.....	Quinine Acetylsalicylate.
Quinine Acid Hydrobromide.	Quinine Dihydrobromide.
Quinine Acid Hydrochloride.	Quinine Dihydrochloride.
Quinine Acid Sulphate.....	Quinine Bisulphate.
Quinine Bromide.....	Quinine Hydrobromide.
Quinine Disulphate.....	Quinine Sulphate.
Quinine Iodide.....	Quinine Hydriodide.
Quinine Salacetate.....	Quinine Acetylsalicylate.
Quinine Sulphate, Basic.....	Quinine Sulphate.
Quinine Sulphate, Neutral...	Quinine Bisulphate.
Quinine Sulphate, Soluble...	Quinine Bisulphate.
Quinisan*	Quinine Disalicylosalicylate.
Quinoform.....	Quinine Formate.
Quinoidine.....	Amorphous Quinine.
Quinol.....	Hydroquinone.
Quinophan.....	Cinchophen.
Quinoxyl*.....	Chiniofon.
R.A.S.*.....	Radio-Active Selenide.
Raddle.....	Armenian Bole.
Radiostol*.....	Calciferol.
Radix Fraseri.....	Calumba.
Radon.....	Radium Emanation.
Ragwort.....	Senecio.
Rangoon Oil.....	Heavy Petroleum (<i>approx.</i>)
Rasorite.....	Natural Borax.
Raspail's Solution.....	Aqua Sedativa (<i>q.v.</i>).
Raspberry (<i>Am.</i>).....	<i>Rubus strigosus.</i>
Raspberry (<i>Eng.</i>).....	<i>Rubus Idæus.</i>
Ratafia.....	Essence of Almonds.
Ratsbane.....	Nux Vomica.
Rattlesnake Root.....	Root of <i>Polygala Senega.</i>
Ravogli's Liniment.....	Phenol 1, Glycerin 2, Alcohol (90 per cent.) 16, Rose Water to 32.
Realgar.....	Arsenic Disulphide.
Red Arsenic.....	Arsenic Disulphide.
Red Blister.....	Red Mercuric Iodide Ointment 1 in 8.
Red Bole.....	Armenian Bole.
Red Bottle.....	Whitworth Bottle (<i>q.v.</i>).
Red Chromate of Potash.....	Potassium Dichromate.
Red Cinchona Bark.....	Bark of <i>Cinchona succirubra.</i>
Red Crocus.....	Calcined Iron Oxide.
Red Drops.....	Compound Tincture of Lavender.
Red Gum.....	Eucalyptus Kino.
Red Hydrated Oxide of Iron.	Red Precipitated Ferric Oxide.
Red Lavender.....	Compound Tincture of Lavender.
Red Lead.....	Red Oxide of Lead.
Red Oil.....	Liquid Paraffin coloured with Alkanet.

Red Pepper	Capsicum.
Red Phosphorus	Amorphous Phosphorus.
Red Precipitate	Red Mercuric Oxide.
Red Prussiate of Potash	Potassium Ferricyanide.
Red Raddle	Calcined Iron Oxide.
Red River Snake Root	Serpentary.
Red Rub.	Whitworth Red Bottle (<i>q.v.</i>).
Red Rudd	Armenian Bole.
Red Sandal Wood	Red Sanders Wood.
Red Sin	Potassium Permanganate.
Red Wash	Lotio Rubra, B.P.C.
Red Water Bark	Sassy Bark.
Redoxon*	Ascorbic Acid.
Regnault's Anæsthetic	Chloroform 4, Methyllic Alcohol 1.
Regulus of Antimony	Metallic Antimony.
Renaglandin*	Adrenaline.
Rennin	Rennet.
Resin	Colophony.
Resin of Ipomœa	Scammony Resin.
Resin Ointment	Unguentum Colophonii, B.P.C.
Resin Plaster	Emplastrum Colophonii, B.P.
Resina Cannabidis	Extract of Indian Hemp.
Resorbin	A Mixture of Almond Oil and Beeswax, with Gelatin, Soap, and Hydrous Wool Fat.
Rhatany Root	Krameria.
Rhodallin	Thiosinamine.
Rhodinol	Geraniol.
Rhodosaccharum	Syrup of Rose.
Riga Balsam†	Oils of Lavender, Clove, Cinnamon, Thyme, Mace, and Lemon, each 1; Balsam of Peru, 4; Oil of Sage, 1½; Tincture of Saffron, 2½; Alcohol (90 per cent.), 250.
Rochdale Salt	Sodium Potassium Tartrate.
Roche Alum	Alum in crystalline fragments or powder coloured with Armenian Bole.
Rochelle Salt	Sodium Potassium Tartrate.
Rochi Gallis	Roche Alum (<i>q.v.</i>).
Rock Alum	Roche Alum (<i>q.v.</i>).
Rock Ammonia	Ammonium Carbonate.
Rock Oil	Petroleum.
Rock Salt	Native Sodium Chloride.
Roman Alum	Roche Alum (<i>q.v.</i>).
Roman Chamomile	Anthemis.

†Chemists in East Coast seaports are frequently asked for Riga Balsam and it has been assumed that Friar's Balsam is intended, but true Riga Balsam contains neither benzoin nor aloes. It is a favourite all-round medicine in Riga, being especially esteemed as a stomachic, cold cure, and pick-me-up. It is dark brown in colour with a pleasantly aromatic taste.

Roman Ointment	A Mixture of Extract of Opium, Extract of Belladonna, Glycerin, and Resin Ointment.
Roman Vitriol	Copper Sulphate.
Rosaniline Hydrochloride	Magenta.
Rose Pink	Chalk tinted with Brazil Wood Decoction.
Roseine	Magenta.
Rosin	Colophony.
Rothera's Crystals	Sodium Nitroprusside.
Rotten Stone	Soft, friable Aluminium Silicate.
Rouge, Jewellers'	Calcined Ferric Oxide.
Rouge, Mineral	Calcined Ferric Oxide.
Rouge, Toilet	Carmine and Chalk.
Rouge, Toilet Vegetable	Diluted Carthamin.
Roxenol	Liquor Chloroxylenolis, B.P. Add. VI.
Rubine	Magenta.
Rubini's Essence, or Rubini's Essence of Camphor	An alcoholic solution, 1 in 2½.
Ruby Wood	Red Sanders Wood.,
Rufus Pill	Pil. Aloes et Myrrh. B.P.C.
Rusven*	Venom of Russell's viper.
Rutile	Titanium Dioxide.
Ryutan	Gentian.
Ryzamin-B*	Concentrate of Rice Polishings.
SSe*	Colloidal Sulphur-Selenium Preparation.
Sabadillin	Veratrine.
Sabinæ Cacumina	Savin.
Sabinæ Herba	Savin.
Sacchari Fæx	Treacle.
Saccharum Lactis	Lactose.
Saccharum Penidium	Barley Sugar.
Saccharum Purificatum	Sucrose.
Saccharum Saturni	Lead Acetate.
Sacred Bark	Cascara Sagrada.
Safflower	<i>Carthamus tinctorius</i>
Saffron of Antimony	Sulphurated Antimony.
Saffron, Meadow or Wild	<i>Colchicum autumnale</i> .
Sailor's Pepper	Cubeb.
Saint Ignatius Beans	Ignatia.
St. John Long's Liniment	Lin. Alb., B.P.C.
Sajodin*	Calcium Iodobehenate.
Sal Absinthii	Potassium Carbonate.
Sal Acetosella	Potassium Quadroxalate.
Sal Aëratum	Potassium Bicarbonate.
Sal Alembroth	Ammonio-Mercuric Chloride.
Sal Amarum	Magnesium Sulphate.
Sal Ammoniac	Ammonium Chloride.
Sal Anglicum	Magnesium Sulphate.

Sal Auri Philosophicum	Potassium Bisulphate.
Sal Carolinum	Carlsbad Salt.
Sal Catharticum Amaræ	Magnesium Sulphate.
Sal Chalybis	Iron Sulphate.
Sal Culinaris	Sodium Chloride.
Sal Digestivum Sylvii	Potassium Chloride.
Sal Diureticus	Potassium Acetate.
Sal de Duobus	Potassium Sulphate.
Sal Enixum	Potassium Bisulphate.
Sal Glauberi	Sodium Sulphate.
Sal Limonis	Potassium Quadroxalate.
Sal Marinus	Bay Salt.
Sal Martis	Ferrous Sulphate.
Sal Mirabile Perlatum	Sodium Phosphate.
Sal Perlatum	Sodium Phosphate.
Sal Polychrestum	Potassium Sulphate.
Sal Rupellensis	Sodium Potassium Tartrate.
Sal Saturni	Lead Acetate.
Sal Sedativa de Homberg	Boric Acid.
Sal Seidlitzense	Magnesium Sulphate.
Sal Seignette	Sodium Potassium Tartrate.
Sal Soda	Exsiccated Sodium Carbonate.
Sal Succini	Succinic Acid.
Sal Tartari	Potassium Carbonate.
Sal Vegetabile	Potassium Tartrate.
Sal Vitrioli	Zinc Sulphate.
Sal Volatile	Ammonium Carbonate.
Salacetol	Acetylmethyl Salicylate.
Saleratus	Potassium Bicarbonate.
Salicylated Vasoliment	Parogen. Salicylat., B.P.C.
Salipyrin	Phenazone Salicylate.
Salol Mouth Wash	Liq. Salol. Co., B.P.C.
Salt of Hartshorn	Ammonium Carbonate.
Salt of Sorrel	Potassium Quadroxalate.
Salt of Steel	Ferrous Sulphate.
Salt of Tartar	Potassium Carbonate.
Salt of Vitriol	Zinc Sulphate.
Salt of Wisdom	Sal Alembroth.
Salt of Wormwood	Potassium Carbonate.
Saltpetre	Potassium Nitrate.
Saltpetre Paper	Charta Nitrata, B.P.C.
Salts of England	Epsom Salts.
Salts of Lemon	Potassium Quadroxalate.
Salurene	Hexamine Salicylate.
Salvarsan*	Arsphenamine.
Salysrgan*	Mersalyl.
Sandal Wood, Red	Wood of <i>Pterocarpus santalinus</i> .
Sandal Wood, White or Yellow	Wood of <i>Santalum album</i> .
Sanders Wood	Red Sandal Wood.
Sanguisuga	Leech.
Santheose	Theobromine.
Sapo Hispanicus	Castile Soap.

Sapo Viridis	Soft Soap.
Sapsun	Aristolochia.
Sassolite	Natural Boric Acid.
Sassy Bark	Erythrophloeum.
Sauerin*	<i>B. Bulgaricus</i> preparations.
Saw Palmetto	Sabal.
Saxin*	Saccharin.
Scammony Milk	Scammony Mixture.
Scheele's Acid	Acid. Hydrocyan. (4 per cent.)
Scheele's Green	Copper Arsenite.
Scheelite	Native Calcium Tungstate.
Schick Test	Diphtheria Test.
Schlippe's Salt	Sodium Sulphantimoniate.
Schweinfurth's Green	Paris Green (<i>q.v.</i>).
Sclavo's Serum	Anti-Anthrax Serum.
Scotch Paregoric	Tinctura Opii Ammoniacata, B.P.C.
Scotch Soda	Impure Sodium Carbonate.
Scott's Dressing	Unguentum Hydrargyri Compositum, B.P.
Scott's Liniment	Linimentum Hydrargyri.
Sculcap	Scutellaria.
Sea Salt	Bay Salt.
Sea Tangle	<i>Laminaria Digitata.</i>
Seawrack	<i>Fucus.</i>
Secale cornutum	Ergot.
Secretin	Duodenal Membrane Extract.
Sedasprin*	Acetyl-Bromo-Salicylic Acid.
Sedative Liquid	Sedative Solution of Opium.
Sedative Mixture	Mist. Brom. et Chloral.
Sedative Salt	Boric Acid.
Seidlitz Powder	Pulv. Efferv. Co., B.P.
Seidlitz Water	Solution of Magnesium Citrate.
Seignette's Salt	Sodium Potassium Tartrate.
Sel d'Angleterre	Epsom Salts.
Sel de Barnit	Zinc Tannate.
Sel de Javelle	Chlorinated Lime.
Sel de Sagesse	Sal Alembroth.
Sel de Science	Sal Alembroth.
Sel Volatil d'Angleterre	Ammonium Carbonate.
Semen Ambrette	Seeds of Musk Mallow.
Semen Amomi	Pimento.
Semen Badiani	Fruit of Star Anise.
Semen Cinæ	Santonica.
Semen Contra	Santonica.
Semen Sanctum	Santonica.
Semen Sinapis	Sinapis Nigra.
Semen Strychni	Nux Vomica.
Semen Zedoariæ	Santonica.
Seneka	Senega Root.
Serum Lactis	Whey.
Sesquicarbonate of Ammonia	Ammonium Carbonate.
Sesquicarbonate of Iron	Ferric Oxide.

Sesquicarbonate of Potash . . .	Potassium Bicarbonate.
Sesquicarbonate of Soda	Sodium Bicarbonate.
Sesquichloride of Iron	Ferric Chloride.
Sesquioxide of Antimony	Antimonious Oxide.
Sesquioxide of Arsenic	Arsenic Trioxide.
Sesquisulphuret of Antimony	Purified Black Antimony.
Sevicaïne*	Procaine Hydrochloride.
Sextol*	Cyclohexanol.
Shadow Meal	Pulv. Barii Sulphatis Co., B.P.C.
Sherbet	Effervescent Lemon Kali.
Shoemaker's Black	Ferrous Sulphate.
Sicily Oil	Inferior Olive Oil.
Sidonal*	Piperazine Quinate.
Sienna	Native Ferric Oxide.
Silantox*	Colloidal Silica.
Silent Spirit	Alcohol.
Sillimanite	Aluminium Silicate.
Silver Vitellin	Mild Silver Proteinate.
Simple Linctus	Linctus Scillæ, B.P.C.
Sinapism	Mustard Plaster.
Sinclair's Glue	Glue or Gelatin 50, Water 100, Thymol or Menthol 0.15%, Glycerin 4 or 6.
Sipeira	Bebeeru Bark.
Smaltite	Native Cobalt Arsenide.
Smelling Salts	Perfumed Ammonia Solution or Am- monium Carbonate.
Smoking Salts	Impure Hydrochloric Acid.
Snake Root	Senega Root.
Snake Root, Red River	Serpentary.
Snake Root, Texan	Serpentary.
Snake Venom Antitoxin	Anti-venom Serum.
Snakeroot, Black	Cimicifuga.
Snakeroot, Virginian	Serpentary.
Snig Oil	Oil of Almonds, used for dropping into the ears.
Soamin*	Sodium Aminarsonate.
Soap Bark	Quillaia.
Soapstone	Talc.
Sobita*	Bismuth Sodium Tartrate (neutral).
Socaloin	Aloin from Socotrine Aloes.
Soda	Sodium Bicarbonate or Carbonate.
Soda Crystals	Sodium Carbonate.
Soda Mint Tablets	Tab. Sod. Bicarb. Co., B.P.C.
Soda Tartarata	Sodium Potassium Tartrate.
Sodæ Potassio-tartaras	Sodium Potassium Tartrate.
Sodæ Sesquicarbonas	Sodium Bicarbonate.
Sodæ Sub-boras	Borax.
Sodæ Subcarbonas	Sodium Carbonate.
Sodio-citro-ferric Pyrophosphate	Soluble Iron Pyrophosphate.
Sodium Alginate	Sodium compounds of soluble acidic constituents of seaweed.

Sodium Antimonytartrate . . .	Antimonii et Sodii Tartras, B.P.C.
Sodium Arsanilate	Sodium Aminarsonate.
Sodium Arseniate	Anhydrous Sodium Arsenate.
Sodium Aurothiosulphate	Gold Sodium Thiosulphate.
Sodium Biborate	Borax.
Sodium Bismuthyltartrate	Bismuthi et Sodii Tartras, B.P.
Sodium Borate	Borax.
Sodium Dihydrogen Phosphate . . .	Sodium Acid Phosphate.
Sodium Dimethylarsonate	Sodium Cacodylate.
Sodium Ethoxide	Sodium Ethylate.
Sodium Fluosilicate	Sodium Silicofluoride.
Sodium Gynocardate	Sodium Chaulmoograte.
Sodium Hyposulphite	Sodium Thiosulphate.
Sodium Indigotindisulphonate . . .	Indigo Carmine.
Sodium Metarsenite	Sodium Arsenite.
Sodium Metharsinite	Disodium Methylarsonate.
Sodium Potassium Tartrobismuthate	Sodium Potassium Bismuthyltartrate.
Sodium Pyroborate	Borax.
Sodium Rhodamide	Sodium Thiocyanate.
Sodium Sulphocarbolate	Sodium Phenolsulphonate.
Sodium Sulphocyanate	Sodium Thiocyanate.
Sodium Tetraborate	Borax.
Sodium Tetraiodophenolph- thalein	Iodophthalein.
Soja Bean Oil	Soya Oil.
Solantoin*	Soluble Phenytoin.
Solid Opodeldoc	Lin. Sap. Camph., B.P.C.
Solid Oxygen	Sodium Peroxide.
Solid Parenol	Parenol, B.P.C.
Solomon's Seal	<i>Polygonatum multiflorum</i> .
Soluble Antiseptic Powder	Pulv. Zinc. Sulph. Co., B.P.C.
Soluble Barbital	Soluble Barbitone.
Soluble Biniodide Tablets	Solv. Hydrarg. Iod., B.P.C.
Soluble Bismuth Tartrate	Bismuth Sodium Tartrate.
Soluble Copaiba	Liquor Copaibæ, B.P.C.
Soluble Cream of Tartar	Potassium Borotartarate.
Soluble Glass	Sodium Silicate.
Soluble Iron Arsenite	Iron and Ammonium Citro-arsenite.
Soluble Peroxide of Iron	Liquor Ferri Oxychloridi, B.P.C.
Soluble Sodio-citro-ferric Phosphate	Soluble Iron Phosphate.
Soluble Tartar	Potassium Tartrate.
Solutio nitroglycerini spirituosa I.A.	Solution of Glyceryl Trinitrate.
Solutio Sulfureti Calcici	Solution of Sulphurated Lime.
Solution of Basic Ferric Chloride	Liq. Ferr. Oxychlor., B.P.C.
Solution of Brilliant Green and Crystal Violet	Liquor Tinctorium, B.P.C.
Solution of Chloroxide of Iron . . .	Liq. Ferr. Oxychlor., B.P.C.
Solution of Pituitary	Pituitary (Posterior Lobe) Extract.

Solution of Sodium Phenate. . .	Liq. Phenol. Alk., B.P.C.
Somonal*	Phenobarbitone.
Soricin*	Sodium Ricinoleate.
Sour Salt.	Citric Acid.
Soy Bean Oil	Soya Oil.
Soyolk*	A flour made from Soya.
Sozolic Acid.	Phenolsulphonic Acid.
Spanish Fly.	Cantharides.
Spanish Oil.	Inferior Olive Oil.
Spanish Pellitory	Pyrethrum Root.
Spanish Pepper	Capsicum.
Spanish Soap	Olive Oil Soap.
Spanish White	Prepared Chalk.
Spasmine*	Benzyl Succinate.
Spasmodin*	Benzyl Benzoate.
Spearmint.	<i>Mentha viridis</i> .
Species	Powder.
Species Aromaticæ	Compound Cinnamon Powder.
Species Diambrae sine	
Odoratis.	Compound Cinnamon Powder.
Species Diatragacanthæ	
Frigidæ	Compound Powder of Tragacanth.
Specificum Paracelsi	Potassium Sulphate.
Sperm Oil.	Spermaceti Oil.
Sphagnol*	Tar products from peaty deposits.
Spirit of Ammonia†	Solution of Ammonia.
Spirit of Bones	Solution of Ammonia.
Spirit of Glonoin	Solution of Glyceryl Trinitrate.
Spirit of Hartshorn	Solution of Ammonia.
Spirit of Mindererus	Dilute Solution of Ammonium Acetate.
Spirit of Myrcia	Compound Spirit of Bay.
Spirit of Red Lavender	Compound Tincture of Lavender.
Spirit of Sal Volatile	Sp. Ammon. Aromat., B.P.
Spirit of Salt	Strong Impure Hydrochloric Acid.
Spirit of Scurvy Grass	Compound Spirit of Horseradish.
Spirit of Tar	Oil of Tar, Light (q.v.).
Spirit of Verdigris	Acetic Acid.
Spirit of Vitriol	Diluted Sulphuric Acid.
Spirit of Vitriol, Sweet	Spirit of Ether.
Spirit of Wine	Alcohol.
Spirits of Acid	Glacial Acetic Acid.
Spiritus Ætheris Chlorici	Spirit of Chloroform.
Spiritus Ammoniaë Anisatus	Liquor Ammoniaë Anisatus, B.P.C.
Spiritus Camphoræ Fort.	Rubini's Essence of Camphor (q.v.).
Spiritus Capillaris	Spiritus Resorcinolis, B.P.C.
Spiritus Cochleariæ	Compound Spirit of Horseradish.
Spiritus Frumenti	Whisky.
Spiritus Glonoini	Solution of Glyceryl Trinitrate.
Spiritus Glycerylis Nitratis	Solution of Glyceryl Trinitrate.

† This is a somewhat dangerous synonym; care should be taken to ensure that Sp. Ammon. Aromat. is not wanted.

Spiritus Mindereri.....	Dilute Solution of Ammonium Acetate.
Spiritus Nitri Dulcis.....	Spirit of Nitrous Ether.
Spiritus Nitri Glauberi.....	Nitric Acid of sp. gr. 1.500.
Spiritus Pimentæ Compositus	Sp. Myrciæ Co., B.P.C.
Spiritus Raphani.....	Compound Spirit of Horseradish.
Spiritus Sacchari.....	Rum.
Spiritus Salis.....	Hydrochloric Acid.
Spiritus Salis Marini Glauberi	Hydrochloric Acid.
Spiritus Tenuior.....	Proof Spirit.
Spiritus Vini Gallici.....	Brandy.
Spiritus Vitrioli Dulcis.....	Spirit of Ether.
Spiritus Volatilis Fetidus.....	Fetid Spirit of Ammonia.
Spiritus Volatilis Oleosus.....	Aromatic Spirit of Ammonia.
Spirocid*.....	Acetarsol.
Splenex*.....	Liquid Extract of Spleen.
Splenoxid*.....	Liquid Extract of Spleen.
Spogel Seeds.....	Ispaghula.
Spray Paraffin.....	Light Liquid Paraffin.
Spurred Rye.....	Ergot.
Squaw Root.....	Caulophyllum.
Stabilarisan*.....	Arsphenamine and Glucose Compound.
Stalk Jalap.....	Ipomea.
Standard Dressing.....	Curatio Normalis, B.P.C.
Staniform*.....	Preparations containing Methyl Stannic Iodide.
Stannum Indicum.....	Zinc.
Star Anise.....	Anisum Stellatum.
Star Grass.....	Aletris.
Starch Gum.....	Dextrin.
Starch Paste.....	Mucilage of Starch.
Starkey's Soap.....	A trituration of equal parts of Potassium Carbonate and Venice Turpentine.
Starwort.....	Aletris.
Steatite.....	Talc.
Steel Drops.....	Tincture of Ferric Chloride.
Steel Wine.....	Iron Wine.
Sterculia Gum.....	Indian Tragacanth, obtained from <i>Sterculia urens</i> Roxb.
Stercus Diaboli.....	Asafetida.
Stibiated Tartar.....	Tartarated Antimony.
Stibnite.....	Antimony Trisulphide.
Stipolac*.....	Iodophthalein.
Stockholm Tar.....	Tar (Wood Tar).
Stokes' Liniment.....	Lin. Alb., B.P.C.
Stomach Mixture.....	Mist. Sod. Bicarb. Aromat., B.P.C.
Stone Mercury.....	Mercuric Chloride in lumps.
Stone Root.....	Collinsonia.
Stovaine*.....	Amylocaine Hydrochloride.
Strengthening Plaster.....	Emplastrum Ferri, B.P.C.
Streptocide*.....	Sulphanilamide.
Streptococcus Antitoxin.....	Antitoxinum Scarlatinum.

Strobili Lupuli.....	Lupulus.
Strong Purgng Pill.....	Pill of Colocynth and Hyoscyamus.
Strong Silver Protein.....	Silver Protein.
Stronger Corn Plaster.....	Emp. Salicyl. Co. Fort., B.P.C.
Strontia.....	Strontium Oxide.
g-Strophanthin.....	Ouabain.
K-Strophanthin.....	Strophanthin.
Strophanthone*.....	Preparations of the active principle of <i>Strophanthus Kombé</i> .
Styptarnin*.....	Cotarnine Chloride.
Styptic Wool.....	Ferric Chloride Wool.
Styptol*.....	Cotarnine Phthalate.
Stypven*.....	Solution of Russell Viper Venom.
Sub-borate of Soda.....	Borax.
Subcarbonate of Bismuth.....	Bismuth Carbonate.
Subcarbonate of Potash.....	Potassium Carbonate.
Subcarbonate of Soda.....	Sodium Carbonate.
Subcarbonate of Zinc.....	Zinc Carbonate.
Subchloride of Mercury.....	Mercurous Chloride.
Subiodide of Mercury.....	Green Mercurous Iodide.
Subitol*.....	Ichthammol.
Sublimate Gauze.....	Carbas. Hydrarg. Perchlor., B.P.C.
Subsulphate of Mercury.....	Turpeth Mineral.
Sudan IV.....	Scarlet Red.
Sudermo*.....	Mesulphen.
Sugar of Lead.....	Lead Acetate.
Sulpharsenobenzene.....	Sulpharsphenamine.
Sulphate of Lime.....	Exsiccated Calcium Sulphate.
Sulphide of Antimony.....	Purified Black Antimony.
Sulphocarbolic Acid.....	Phenolsulphonic Acid.
Sulphonated Lorol*.....	Sodium Lauryl Sulphate.
Sulphonethylmethane.....	Methylsulphonal.
Sulphonmethane.....	Sulphonal.
Sulpho-salicylic Acid.....	Salicylsulphonic Acid.
Sulphostab*.....	Sulpharsphenamine.
Sulphur, Black.....	Crude Native Sulphur.
Sulphur Caballium.....	Black Sulphur.
Sulphur Griseum.....	Black Sulphur.
Sulphur Subiodide.....	Sulphur Iodide.
Sulphur Vegetabile.....	Lycopodium.
Sulphur Vivum.....	Crude Native Sulphur.
Sulphurated Oil.....	Sulphur 1, Olive Oil 4-9, heated together.
Sulphuric Ether.....	Ether.
Sumac Berries.....	Rhus.
Sumach.....	Rhus.
Suppositorium Bismuthi et Resorcinii Compositum.....	Supp. Bism. Subgall. Co., B.P.C.
Suppositorium Peptoni.....	Suppositorium Nutriens, B.P.C.
Suppositorium Plumbi Compositum.....	Supp. Plumb. c. Opio, B.P.
Suprachol*.....	Sodium Dehydrocholate.

Supracort*	Extract of Suprarenal Cortex.
Suprarenalin*	Adrenaline.
Suprarenin	Adrenaline.
Surfeit Water	Solution of Ammonium Acetate.
Surgeon's Agaric	Amadou (<i>Polyporus fomentarius</i>).
Surgical Antiseptic Solution	Liq. Chloroxylonol, B.P.C.
Surgical Instrument Sterilising Solution	Liq. Boracis et Formaldehydi, N.W.F.
Sweating Mixture	Mist. Ammon. Acet. Co., B.P.C.
Sweet Essence of Figs	Compound Syrup of Figs.
Sweet Essence of Rhubarb	Liquor Rhei Dulcis, B.P.C.
Sweet Essence of Senna Pods	Elix. Senn., B.P.C.
Sweet Flag Root	Calamus.
Sweet Oil	Usually Olive Oil.
Swine's Seam or Same	Lard.
Sydenham's Laudanum	Tinctura Opii Crocata, B.P.C.
Syntestrin*	Preparation of Stilbæstrol.
Synthalin*	Decamethylene Diguanidine Dihydrochloride.
Synthovo*	Hexæstrol.
Syrian Rue	Harmal
Syrup of Fox's Lungs	Syrup of Red-poppy.
Syrup of Virginian Prune	Syrup of Wild Cherry.
Syrupus Balsamicus	Syrup of Balsam of Tolu.
Syrupus Citri	Syrup of Lemon.
Syrupus Citri Aurantii	Syrup of Orange.
Syrupus e Spin. Cerv.	Syrup of Buckthorn.
Syrupus Ficorum Aromaticum	Syrupus Ficorum Compositus, B.P.C.
Syrupus Fuscus	Treacle.
Syrupus Glycerophosphatum Compositus (Robin)	Syr. Glycerophosph. et Pepsin. Co., B.P.C.
Syrupus Mineralis	Liquid Paraffin.
Syrupus Phosph. Co.	Compound Syrup of Ferrous Phosphate.
Syrupy Phosphoric Acid	Concentrated Phosphoric Acid.
T.A.B. VACCINE	Anti-Typhoid-Paratyphoid Vaccine.
T.A.B.C. Vaccine	Anti-Typhoid-Paratyphoid-Cholera Vaccine.
T.A.F.	Tuberculin, Albumose-Free.
T.B.E.	Vaccinum Tuberculinum, B.P.C.
T.I.P.*	Iodophthalein.
T.O.A.	Tuberculin Bouillon Filtrate.
Tabaïaco	Opium.
Tabellæ Eastonii	Tab. Ferr. Phosph. c. Quinin. et Strych., B.P.C.
Tabellæ Laxativæ Compositæ	Tab. Leptand. Co., B.P.C.
Tabellæ Trisativ Phosphatum	Tab. Ferr. Phosph. c. Quinin. et Strych., B.P.C.
Tailed Pepper	Cubeb.
Takadiastase*	Diastase.

Takamina	Adrenaline.
Talbor's Powder	Cinchona Bark in Powder.
Talcum Boratum	Pulvis Talci Boricus, B.P.C.
Tanjore Pills	Asiatic Pills.
Tannal Insolubile	Aluminium Tannate.
Tannalbin*	Tannin Albumin.
Tannyl Acetate	Acetannin.
Tantalite	Tantalum Ore.
Tar, Green	Barbados Tar.
Tar Tea	Tar Water.
Tartar	Crude Potassium Acid Tartrate.
Tartar Emetic	Potassium Antimonyltartrate.
Tartarated Antimony	Potassium Antimonyltartrate.
Tartarated Iron	Iron and Potassium Tartrate.
Tartarline	Potassium Bisulphate.
Tartarum Vitriolatum	Potassium Sulphate.
Tartarus Albus	Crude Potassium Acid Tartrate.
Tartarus Boraxatus	Sodium Borotartrate.
Tartarus Depuratus	Potassium Acid Tartrate.
Tartarus Natronatus	Sodium Potassium Tartrate.
Tartarus Ruber	Crude Potassium Acid Tartrate.
Tartarus Stibiatus	Tartarated Antimony.
Tartarus Tartarisatus	Potassium Tartrate.
Tartras Potassæ et Ferri	Tartarated Iron.
Tasteless Purging Salt	Sodium Phosphate.
Tea-tree Oil	Ti-tree Oil (<i>q.v.</i>).
Tectum Argenti	Bismuth.
Teel Oil	Sesame Oil.
Telicherry Bark	Holarrhena.
Tennant's Salt	Chlorinated Lime.
Terebinthina	Crude Turpentine.
Terebinthina Cocta	Resin.
Terebinthina Cypria	Chian Turpentine (<i>q.v.</i>).
Terebinthina Lagigna	Venice Turpentine.
Terebinthina Pistacina	Chian Turpentine (<i>q.v.</i>).
Terebinthina Vulgaris	Crude Turpentine.
Terpilenol	Terpineol.
Terpine	Terpene Hydrate.
Terpinoform	Terpineol 5, Alcohol (90 per cent. 20), Soft Soap 40, Formaldehyde Solution 35.
Terra Alba	Kaolin.
Terra Cariosa	Rotten Stone.
Terra Japonica	Catechu.
Terra Ponderosa	Barium Sulphate.
Terra Ponderosa Salita	Barium Chloride.
Terra Rosæ	Rose Pink.
Tersulphuret of Antimony	Purified Black Antimony.
Tertiary Amyl Alcohol	Amylene Hydrate.
Testæ	Oyster Shells.
Tetanol*	Solution of Calcium Levulinate.
Tetrachloromethane	Carbon Tetrachloride.

Tetraform*	Carbon Tetrachloride.
Tetraiodophthalein Sodium . .	Iodophthalein.
Tetraiodopyrrol	Iodopyrrole.
Tetramethylthionine Chloride	Methylene Blue.
Teufelsdrück	Asafetida.
Texan Snake Root	Serpentary.
Thebaicum	Opium.
Theelin	Œstrone.
Theelol*	Œstriol in capsules.
Theine	Caffeine.
Thelestrin*	Solution of Œstrone.
Theocalcine	Theobromine Calcium Salicylate.
Theocin*	Theophylline.
Theocin Sodium Acetate* . . .	Theophylline and Sodium Acetate.
Theogardenal Tablets*	Tablets of Phenobarbitone and Theobromine.
Theominal Tablets*	Tablets of Phenobarbitone and Theobromine.
Theotone Tablets*	Tablets of Phenobarbitone and Theobromine.
Thermogene*	Capsicum Tissue.
Thiamin Chloride	Vitamin B ₁ .
Thiamine Hydrochloride . . .	Vitamin B ₁ .
Thiazamide*	Sulphathiazole.
Thiocol*	Potassium Guaiacolsulphonate.
Thiostab*	Injection of Sodium Thiosulphate.
Thompson's Antibilious Pills	Aloes 2 gr., Mastic $\frac{1}{2}$ gr.
Thornapple Seed	Stramonium Seed.
Three Oils	Cajuput, Eucalyptus, and Olive Oils.
Thridace	Lettuce Opium (<i>q.v.</i>).
Throat Balls	Sal Prunella Balls.
Thromboplastin	Hæmostatic prepared from blood or tissue cells.
Thus, Gum	American Frankincense.
Thyme Camphor	Thymol.
Thymic Acid	Thymol.
Thyracoids*	Desiccated Thyroid Tablets.
Thyranon*	Standardised Thyroid Extract.
Thyroidectin*	Powder prepared from blood of thyroidectomised animals.
Thyroidine	Thyroid.
Tic Plaster	Belladonna Plaster, 1 in. square.
Til Oil	Sesame Oil.
Tillman's Dressing	Cellulose Wadding.
Timbo Powder	Lonchocarpus Root Powder.
Tincal	Natural Borax.
Tinctura Actææ	Tincture of Cimicifuga.
Tinctura Amara	Compound Tincture of Gentian.
Tinctura Amomi Repentis . . .	Tincture of Cardamom.
Tinctura Balsami Tolutani . . .	Tincture of Tolu.
Tinctura Balsamica	Compound Tincture of Benzoin.
Tinctura Cacti Grandiflori . .	Tinct. Cerei, B.P.C.

Tinctura Camphoræ	Spirit of Camphor.
Tinctura Cantharidini	Liquor Cantharidini, B.P.C.
Tinctura Corticis Peruviani Composita	Compound Tincture of Cinchona.
Tinctura Ferri Sesquichlor. . .	Tincture of Ferric Chloride.
Tinctura Guaiaci Co.	Ammoniated Tincture of Guaiacum.
Tinctura Gummi Rubri	Tinct. Kino Eucalypt., B.P.C.
Tinctura Hieræ	Aloes Wine.
Tinctura Iodi	Liquor Iodi Mitis, B.P.
Tinctura Iodi Ætherea	Liquor Iodi Æthereus, B.P.C.
Tinctura Iodi Decolorata . . .	Liquor Iodi Decoloratus, B.P.C.
Tinctura Iodi Fortis	Liquor Iodi Fortis, B.P.
Tinctura Iodi Mitis	Liquor Iodi Mitis, B.P.
Tinctura Iodi Oleosa	Liquor Iodi Oleosus, B.P.C.
Tinctura Japonica	Tincture of Catechu.
Tinctura Lauri Cinnam.	Tincture of Cinnamon.
Tinctura Lyttæ	Tincture of Cantharides.
Tinctura Maris cum Spiritu Solis	Tincture of Ferric Chloride.
Tinctura Opii benzoicæ I.A. . .	Tinct. Opii Camph., B.P.
Tinctura Phosphori Composita	Liq. Phosphor. Co., B.P.C.
Tinctura Quinifæ Co.	Tincture of Quinine.
Tinctura Quininae Ammoniata	Liq. Quinin. Ammon., B.P.
Tinctura Rhei	Compound Tincture of Rhubarb.
Tinctura Rosarum	Acid Infusion of Roses.
Tinctura Rosarum Rubrarum	Acid Infusion of Roses.
Tinctura Sacra	Aloes Wine.
Tinctura Saponis et Opii . . .	Liniment of Opium.
Tinctura Sennæ	Compound Tincture of Senna.
Tinctura Stomachica	Compound Tincture of Cardamom.
Tinctura Strychni	Tincture of Nux Vomica.
Tinctura Thebaicæ	Tincture of Opium.
Tinctura Valerianæ Co.	Ammoniated Tincture of Valerian.
Tinctura Valerianæ Volatilis . .	Ammoniated Tincture of Valerian.
Tincture of Actæa Racemosa . .	Tinctura Cimicifuga, B.P.C.
Tincture of Bark	Compound Tincture of Cinchona.
Tincture of Hiera Picra	Aloes Wine.
Tincture of Steel	Tincture of Ferric Chloride.
Tin-Ox*	Combination of Tin and Tin Oxide in Tablets.
Tinstone	Native Stannic Oxide.
Ti-tree Oil	Oil from <i>Melaleuca alternifolia</i> .
Ti-Trol*	Ti-tree Oil.
Tobacco Water	Infusion of Tobacco.
Toilet Vinegar	Acetum Odoratum, B.P.C.
Toluenesulphonchloroamide . .	Chloramine.
Toluenesulphondichloroamide	Dichloramine.
Toluol.	Toluene.
Tolysin*	Neocinchophen.
Tonic Cups	Cups made of Quassia Wood.
Tonic Mixture	Mist. Nux. Vom. Acid.
Tonquin Beans	Tonka Seed.

Toothache Bark	Zanthoxylum.
Toothache Jelly	Phenol and Collodion, equal parts.
Toothache Seeds	Henbane Seeds.
Tophosan*	Cinchophen.
Touchwood	Amadou.
Train Oil	Whale Oil (<i>q.v.</i>).
Traumatic Balsam	Tinct. Benzoin. Co., B.P.
Traumaticin	Liquor Gutta Percha, B.P.C.
Tribasic Magnesium Phosphate	Magnesii Phosphas, B.P.C.
Tribromomethane	Bromoform.
Tricalcic Phosphate	Calcium Phosphate, B.P.
Trichloro- <i>tert.</i> -butyl Alcohol ..	Chlorbutol.
Trichlorobutylidene Glycol ..	Butylchloral Hydrate.
Trichloroethylideneglycol ..	Chloral Hydrate.
Trichloromethane	Chloroform.
Trichlorophenic Acid	Trichlorophenol.
Tridestin*	Œstriol.
Triiodomethane	Iodoform.
Trikresol*	A preparation of the three Cresols.
Trilactine*	Lactic Acid Bacilli preparations.
Trilene*	Trichlorethylene.
Trimethylene	Cyclopropane.
Trimethylglycocol	Betaine.
Trimethylxanthine	Caffeine.
Trinesium	Magnesium Trisilicate.
Trinitrin Tablets	Tab. Glycerylis Trinitratis, B.P.
Trinitrophenic Acid	Trinitrophenol.
Trioxymethylene	Paraformaldehyde.
Trip	Ferric Oxide.
Triple Dye	Pig. Viola Crys. Co., B.P.C.
Triple Syrup Tablets	Tab. Phosph. et Hypophosph. Co., B.P.C.
Tripolite	Diatomite.
Trisnitrate of Bismuth	Bismuth Subnitrate.
Triticum	Couch Grass.
Trooper's Ointment	Unguentum Mercuriale, B.P.
Trotter Oil	Neatsfoot Oil.
Trypaflavin*	Eufllavine.
Tryparsone	Tryparsamide.
Tuba Root	Derris.
Tubercle Bacillary Emulsion ..	Vaccinum Tuberculinum, B.P.C.
Tubercle Vaccine "R"	Tuberculosis Immunising Vaccine (Nathan Raw).
Tuberculin Koch	Tuberculinum Pristinum, B.P.
Tuberculin-Original Alt.	Tuberculin Bouillon Filtrate.
Tuffier's Solution	Amylocaine Hydrochloride 0.1 g., Sodium Chloride 0.1 g., Water to 1 ml.
Turf Moss	Sphagnum.
Turkey Red Oil	Sodium Sulphoricinate.
Turlington's Balsam	Compound Tincture of Benzoin.
Turnbull's Blue	Ferrous Ferricyanide.

Turnbull's Tincture of Capsicum	Tinct. Capsici Fort., B.P.C.
Turnera	Damiana.
Turnsole	Litmus.
Turpentine, Bordeaux	Oleoresin from <i>Pinus maritima</i> .
Turpentine, Canada	Canada Balsam.
Turpentine, Chian	Oleoresin from <i>Pistacia terebinthus</i> .
Turpentine Drops	Dutch Drops.
Turpine, Venice	Terebinthina Veneta Factitia (B.P.C.).
Turpeth Mineral	Mercury Oxysulphate.
Tutty Powder	Crude Zinc Oxide.
Tylcalsin*	Calcium Acetylsalicylate.
Tyllithin*	Lithium Acetylsalicylate.
Typhoid Solution	Mercuric Chloride 1 oz., Strong Hydrochloric Acid 25 oz., Water to 500 oz.; for disinfecting excreta.
ULEXITE	Calcium-sodium Borate.
Unguentum Ægyptiacum	Linimentum Æruginis.
Unguentum Analgesicum	Ung. Methyl. Salicyl. Co., B.P.C.
Unguentum Balsamicum	Elemi Ointment.
Unguentum Basilicum	Ointment of Colophony.
Unguentum Betulæ Co.	Ung. Methyl. Salicyl. Co., B.P.C.
Unguentum Cæruleum	Mercurial Ointment.
Unguentum Calomelanos	Calomel Ointment.
Unguentum Cereum	Simple Ointment.
Unguentum Cerussæ	Lead Carbonate Ointment.
Unguentum Ceti	Spermaceti Ointment.
Unguentum Diachylon	Ung. Plumb. Oleat., B.P.C.
Unguentum Emolliens	Rose Water Ointment.
Unguentum Galeni	Cold Cream.
Unguentum Gallæ Co.	Ung. Gall. c. Opio, B.P.C.
Unguentum Hydrargyri Mite.	Unguentum Mercuriale, B.P.
Unguentum Hydrarg. Nit.-Ox.	Red Mercuric Oxide Ointment.
Unguentum Iodi Co.	Iodine Ointment.
Unguentum Lanæ	
Compositum	Ung. Adip. Lan. Co., B.P.C.
Unguentum Lanolini	Ung. Adip. Lan. Hydros., B.P.C.
Unguentum Lanolini	
Anhydrosi	Ung. Adip. Lan., B.P.C.
Unguentum Leniens	Rose Water Ointment.
Unguentum Lyttæ	Cantharidin Ointment.
Unguentum Metallorum	Ung. Hydrarg. Plumb. et Zinc., B.P.C.
Unguentum Naphthol	
Compositum	Ung. Betanaph. Co., B.P.C.
Unguentum Oleoresinæ	
Capsica Compositum	Ung. Capsic. Co., B.P.C.
Unguentum Ovillum	Prepared Suet.
Unguentum Plumbi	Lead Carbonate Ointment.
Unguentum Plumbi	
Scytodepsici	Tannate of Lead.

Unguentum Populeum†	Green Elder Ointment (<i>approx.</i>).
Unguentum Præcip. Albi.	Ointment of Ammoniated Mercury.
Unguentum Refrigerans	White Rose Ointment.
Unguentum Resinæ	Unguentum Colophonii, B.P.C.
Unguentum Rubrum	Ung. Rub. Scarlat., B.P.C.
Unguentum Sabinæ	Fresh Savin 'Tops bruised 4, Yellow Beeswax 1·5, Benzoinated Lard 8.
Unguentum Saturni	Lead Acetate Ointment.
Unguentum Sedativum	Ung. Calam. Co., N.W.F.
Unicorn's Root	Aletris.
Unna's Compound Pyrogallol Ointment	Ung. Pyrogall. Co., B.P.C.
Unna's Paste	Gelatinum Zinci, B.P.
Unscented Vanishing Cream	Past. Acid. Stear., B.P.C.
Uradal	Carbromal.
Uranin	Sodium Fluorescein.
Uranyl Nitrate	Uranium Nitrate.
Urazine*	Piperazine Citro-salicylate.
Urea-Quinine	Quinine and Urea Hydrochloride.
Urisol	Hexamine.
Uritone	Hexamine.
Uropac*	Iodoxyl.
Uroselectan B*	Iodoxyl.
Uvæ Passæ	Raisins.
Uvæ Passæ Minores	Currants.
Vaccinum Antivariolum	Vaccine Lymph.
Vaccinum Variolæ	Vaccine Lymph.
Valerianic Ether	Ethyl Valerianate.
Vallet's Pills	Iron Pills.
Van Swieten's Solution	See Liqueur de Van Swieten.
Vanillic Aldehyde	Vanillin.
Vanilloes	Vanilla Pods.
Varixol*	Quinine and Urethane Solution.
Vasaka	Adhatoda.
Vasoconstrictine*	Adrenaline.
Vasoliment	Parogenum, B.P.C.
Veal Marrow	Red Bone Marrow.
Vegetable Black	A very light Lamp-black.
Vegetable Calomel	Resin of Podophyllum.
Vegetable Laxative Tablets	Tab. Leptand. Co., B.P.C.
Vegetable Mercury	Podophyllum.
Vegetable Salt	Potassium Tartrate.
Vegetable Sulphur	Lycopodium.
Venene	Snake Venom.
Venetian Red	Native Ferric Oxide.
Venice Soap	Olive Oil Soap.
Venice Turpentine	Terabinthina Veneta Factitia, B.P.C.

† True Unguentum Populeum was prepared by digesting the buds of *Populus balsamifera* in melted lard.

Ventræmon*	Desiccated Stomach.
Ventriculin*	Desiccated Stomach.
Verdigris	Basic Copper Acetate.
Verine	Veratrine.
Vermilion	Red Mercuric Sulphide.
Veronal*	Barbitone.
Veronal-Sodium*	Soluble Barbitone.
Vesalvine*	Hexamine.
Vichy Salt	Sodium Bicarbonate.
Vienna Mixture	Ether 3, Chloroform 1½, by weight.
Vinegar, Aromatic	Acid Aceticum Aromaticum, B.P.C.
Vinegar, Distilled	Diluted Acetic Acid.
Vinegar, Toilet	Acetum Odoratum, B.P.C.
Vinegar, White	Diluted Acetic Acid.
Vinegar, White Wine	Vinegar prepared from White Wine.
Vinegar, Wine	Vinegar prepared from Red or White Wine.
Vinesthene*	Vinyl Ether.
Vinum Chalybeatum	Iron Wine.
Vinum Martis	Iron Wine.
Vinum Stibiatum	Antimonial Wine.
Vioform*	Iodochlorhydroxyquinoline.
Violet Root	Orris Root.
Virgin Oil	Finest (Aix) Olive Oil, or the oil which separates spontaneously from the paste of crushed olives.
Virgin Wax	White Beeswax.
Viomone*	Testosterone.
Viteolin*	Wheat Germ Oil Extract.
Vitis Alba	Bryony.
Vitriol	Sulphuric Acid.
Vitriol, Blue	Copper Sulphate.
Vitriol, Green	Ferrous Sulphate.
Vitriol, Roman	Copper Sulphate.
Vitriol, Salt of	Zinc Sulphate.
Vitriol, White	Zinc Sulphate.
Vitriolated Magnesia	Magnesium Sulphate.
Vitriolic Acid	Sulphuric Acid.
Vlemmckx's Solution	Liquor Calcis Sulphuratæ, B.P.C.
Vol	Ammonium Carbonate.
Volatile Alkali	Ammonia.
Volatile Liniment	Liniment of Ammonia.
Volatile Salt	Ammonium Carbonate.
WADE'S DROPS	Compound Tincture of Benzoin.
Wahoo Bark	Euonymus.
Warburg's Tincture	Tinctura Antiperiodica, B.P.C.
Ward's Essence for Headache	Ammoniated Liniment of Camphor (<i>approx.</i>).
Ward's Paste	Confection of Pepper.
Water Glass	Sodium Silicate.

Water of Saturn	Dilute Solution of Lead Subacetate.
Wattle Bark	Acacia Bark.
Wax, Carnauba	Wax from <i>Copernicia cerifera</i> .
Wax, Japan	Wax from <i>Rhus succedaneum</i> .
Wax Myrtle Bark	Bayberry.
Webster's Pills, Lady	Aloes 2 gr., Mastic $\frac{1}{2}$ gr.
Wedel's Oil	Oil of Bergamot 1, Camphor 4, Oil of Almonds 32.
West African Copal	From <i>Copaifera Guibourtiana</i> .
Wet Ash	Commercial Pot. Carb.
Whale Oil	Oil from blubber of various species of <i>Balæna</i> .
White Agaric	Agaric.
White Apiol	Crystalline Apiol.
White Arsenic	Arsenic Trioxide.
White Bismuth	Bismuth Subnitrate.
White Bole	Kaolin.
White Cerate	Spermaceti Ointment.
White Copperas	Zinc Sulphate.
White Diachylon Plaster	Plaster of Lead.
White Embrocation	Lin. Alb., B.P.C.
White Henna	Paste containing Solution of Hydrogen Peroxide and an alkali, e.g., Ammonia.
White Lac	Shellac bleached with Chlorine.
White Lead	Lead Carbonate.
White Oil of Camphor	Rectified Oil of Camphor.
White Oils	White Liniment.
White Oxide of Arsenic	Arsenic Trioxide.
White Pitch	Burgundy Pitch.
White Precipitate	Ammoniated Mercury.
White Snuff	Menthol and Cocaine Snuff.
White Soap Plaster	Plaster of Soap.
White Wine Vinegar	Vinegar prepared from White Wine; diluted Acetic Acid (<i>approx.</i>).
Whitehead's Varnish	Pig. Iodof. Co., B.P.C.
Whitfield's Ointment	Ung. Acid. Benz. Co., B.P.C.
Whitworth Red Bottle	† Oil of Origanum 1, Compound Tincture of Lavender 4, Alcohol 8.
Wild Cinnamon Bark	Canella.
Wild Indigo Root	Baptisia.
Wilkinson's Ointment	Sublimed Sulphur 2 dr., Tar 2 dr., Potash Soap 4 dr., Benzoinated Lard 4 dr., Purified Talc 1 dr.
Wintergreen Oil	Oil of Sweet Birch.
Winter's Bark	Bark of <i>Drimys Winteri</i> .
Witch Hazel Cream	Past. Hamam., B.P.C.
Witch Hazel Leaves	Hamamelis.
Witherite	Barium Carbonate.
Wolfram	Native Iron and Manganese Tungstate.

† Other formulæ are in use.

Wolfsbane.....	Aconite Leaf.
Wood Naphtha.....	Crude Methyl Alcohol.
Wood Oil.....	Gurjun Balsam.
Wood Spirit.....	Crude Methyl Alcohol.
Wood Tar.....	Tar.
Woody Nightshade.....	Bittersweet.
Woorali.....	Curare.
Worm Grass.....	Spigelia.
Wormseed.....	Santonica.
Worm Seed, American.....	Chenopodium.
Wormwood Salts.....	Impure Potassium Carbonate.
Wound Balsam.....	Compound Tincture of Benzoin.
Wound Dressings.....	Standard Dressings Nos. 13, 14 and 15.
Wound Stone.....	Lapis Divinus.
Wound Water.....	Spirit of Rosemary and Spirit of Origanum, equal parts.
Wourara.....	Curare.
Wurrus.....	Kamala.
X-RAY BISMUTH.....	Bismuth Carbonate.
Xylol.....	Xylene.
YATREN*.....	Chinifon.
Yaw Root.....	Stillingia.
Yellow Bark.....	Bark of <i>Cinchona Calisaya</i> .
Yellow Basilicon Ointment...	Unguentum Colophonii, B.P.C.
Yellow Jasmine Root.....	Gelsemium.
Yellow Prussiate of Potash...	Potassium Ferrocyanide.
Yellow Root.....	Hydrastis.
Yellow Wash.....	Lotio Hydrargyri Flavum, B.P.C.
Yellow Wood.....	Brazil Wood.
Yerba Santa.....	Eriodictyon.
Yoghourt.....	Milk fermented by <i>B. Acid. Lactic</i> .
Z.I.P.P.	Pasta Zinci et Iodoformi, B.P.C.
Zanaloin.....	Aloin of Zanzibar Aloes.
Zanzibar Copal.....	Copal.
Zea Stigmata.....	Maize Stigmas.
Zedoaria Semina.....	Santonica.
Zeller's Ointment.....	Ammoniated Mercury Ointment.
Zinc Dust.....	A mixture of finely-divided Zinc and Zinc Oxide.
Zinc Fume.....	Zinc Dust.
Zinc Subcarbonate.....	Zinc Carbonate.
Zinc Sulphocarbonate.....	Zinc Phenolsulphonate.
Zinc White.....	White Zinc Carbonate.
Zincum Vitriolatum.....	Zinc Sulphate.
Zittmann's Pills.....	Pil. Hydrarg. Subchlor. Colocynth. et Hyoscy., B.P.C.
Zygon*.....	Wheat Germ Oil.

INDEX

ABBREVIATIONS USED IN PRESCRIPTIONS, 134, 145

Abortifacients, Sale of, 243
Acetone in Urine, Tests for, 265.
Adrenaline, 306.
Advertising of Medicines, 209.
Aerobes, 283.
Albumin in Urine, Tests for, 265.
Alcohol, Dilution of, 165.
Alcohol Dilution Table, 166.
Alcohol in Medicinal Preparations, 164.
Alcoholic Strength of B.P. Preparations,
Table of, 167.
Amidopyrine Test for Blood, 267, 282.
Anaerobes, Facultative, 283.
Anaerobic Culture Media, 286.
Aneurine Hydrochloride, 297, 303.
Animals, Acts for Protection of, 243.
Animals (Anaesthetics) Act, 1919, 243.
Antibacterial Sera, 291.
Antibodies, 290.
Antidotes to Poisons, 246.
Anti-freeze Solutions, 185.
Antigens, 290.
Antilogarithms, 427, 428.
Antiseptics, 292.
Antitoxic Sera, 291.
Antitoxins, 291.
Apothecaries' Measure, 149, 151.
Apothecaries' Weight, 150, 151.
Apprentice, 7.
Apprentice-Master, 7.
Aromatic Waters, Preparation of, 31.
Articles of Pupillage, 7.
Artificial Respiration, 248.
Ascorbic Acid, 299, 303.
Atomic Weights, *Inside Front Cover*.
Aufrecht Tube, 266.
Authorised Sellers of Poisons, 186.
Autoclaving, 68.
Avoirdupois Weight, 150, 151.

B.P. (1932) EQUIVALENT FORMULÆ, 80.
B.P. (1932), Preparations, Alcoholic
Strengths of, 167.
B.P. (1932), Proportions of Active
Ingredients in preparations of, 116.
Bacteria, Classification of, 284.
Bacteria, Effect of pH on, 283.
Bacteria, Identification of, 285.
Bacteria, Staining of, 288.
Bacterial Filters, Types of, 71.
Bactericides, 292.
Bacteriology, Notes on, 283.
Bacteriostats, 292.
Balances, Manipulation of, 15.
Balances, Types of, 15.
Bassorin Paste, 58.
Baumé's Hydrometer, 162.
Beef Broth Culture Medium, 286.

Benedict's Reagents, 270, 271.
Benevolent Fund, 4.
Benzidine Test for Blood, 280.
Bile Pigments in Urine, Tests for, 266.
Bile Salts, Tests for in Urine, 267.
Bilirubin in Faeces, Test for, 281.
Biochemical Analysis, 283.
Biochemical Analysis, Post-graduate
Diploma, 3.
Biological Products, Labelling Require-
ments, 211.
Blisters, Preparation of, 67.
Blood, Examination of, 273.
Blood in Faeces, Tests for, 281.
Blood Sugar, Tests for, 275.
Blood Urea, 276.
Blood in Urine, Tests for, 267.
Bougies, Preparation of, 65.
Branch Organisation, 5.
British Pharmaceutical Codex, 2, 12.
British Pharmaceutical Conference, 2.
British Pharmacopoeia, 12.
Buffer Solutions, 158.

CACHETS, DISPENSING OF, 51.
Calciferol, 302.
Calcium-Regulating Factor, 306.
Calculi in Urine, Tests for, 268.
Calendar of the Pharmaceutical Society,
2.
Calorie, Definition of, 293.
Calorie Requirements, 293.
Cancer Act, 1939, 242.
Capsule Stain, 289.
Capsules, Bacterial, 284.
Capsules, Dispensing of, 51.
Capsules, Enteric, 53.
Carbol-fuchsin Stain, 289.
Carotene, 296.
Cats, Dosage Table for, 309.
Cattle, Dosage Table for, 309.
Cerebrospinal Fluid, Examination of,
278.
Charter Travelling Scholarship, 4.
Chemist and Druggist Qualifying
Examination, 9.
Chemists' Central Fund (N.H.I.), 239.
Chickens, Dosage Table for, 309.
College of the Pharmaceutical Society, 3.
Colour Index of Blood, 275.
Colour Standards, 159.
Confections, Preparation of, 58.
Cooked Meat Medium, 286.
Corpus Luteum, 308.
Corticosterone, 306.
Corticotrophic Hormone of Pituitary,
305.
Cortin, 306.
Council of the Pharmaceutical Society,
vi, 1.

Creatinine in Urine, 270.
 Cruelty to Animals Act, 243.
 Culture Media, 285.
 DANGEROUS DRUGS ACTS, 212.
 Dangerous Drugs, Exemptions, 213.
 Dark Adaptation Test, 297.
 Desoxycorticosterone, 307.
 Devon and Cornwall Exhibition in Pharmacy, 7.
 Diabetes, Diet in, 301.
 Diabetogenic Hormone of Pituitary, 305.
 Diagnostic Bacterial Products, 291.
 Diet in Disease, 301.
 Diet of Infants and Children, 300.
 Digest Broth Culture Medium, 286.
 Dihydrotychsterol, 308.
 Disclosure of Composition of Medicines, 209.
 Disinfectants, 292.
 Dispensing, Principles of, 14.
 Doses, Equivalent Metric and Imperial, 133.
 Doses of Official Medicaments, 121.
 Doses Proportionate to Age, 133.
 Drug, Definition of, 228.
 Drug Tariff, 238.
 Dusting Powders, 50.
 EDUCATION OF PHARMACISTS, 3.
 Effervescent Granules, 57.
 Emmenin, 308.
 Emulgents, 35.
 Emulsions, Preparation of, 34.
 Emulsions, Types of, 32.
 Endocrine Organs, 304.
 Endotoxins, 283.
 Eshbach's Albuminometer, 266.
 Eshbach's Reagent, 266.
 Examination Chart, 11.
 Examination Regulations, 3, 7.
 Examinations, 9.
 Excise Licences, 231.
 Exotoxins, 283.
 Extra Pharmacopœia, 2.
 Eye Drops, Dispensing of, 38.
 Eye Lotions, Dispensing of, 38.
 Eye Ointments, Dispensing of, 62.
 F.S.H., 305.
 Factors, Miscellaneous, 155.
 Fæces, Examination of, 281.
 Fat in Fæces, Determination of, 282.
 Fehling's Solution, 270, 272.
 Fermentation Test for Sugar in Urine, 271.
 Fevers, Diet in, 301.
 Flagella, 284.
 Follicle-Stimulating Substance, 305.
 Food and Diet, 293.
 Food and Drugs Act, 1938, 228.
 Food Values, Calculation of, 294.
 Forensic Pharmacy, 186.
 Fowls, Dosage Table for, 309.
 Fractional Test Meal, 279.
 Freezing-Mixtures, 134.
 Fungi, Pathogenic, 290.
 Fungicides, 292.
 Fungistatics, 292.

GASTRIC CONTENTS, EXAMINATION OF, 279.
 Gastro-intestinal Diseases, Diet in, 301.
 Gerhard's Test, 265.
 Glycotrophic Hormone of Pituitary, 305.
 Glycuronic Acid in Urine, 270.
 Gmelin's Test, 267.
 Goats, Dosage Table for, 309.
 Gonadotrophic Substances, 305.
 Gout, Diet in, 301.
 Gower's Solution, 274.
 Gram's Stain, 288.
 Granules, Effervescent, 57.
 Granules, Tablet, 54.
 Greek Alphabet, 155.
 Growth Hormone of Pituitary, 304.
 Gunzberg's Test for Hydrochloric Acid, 280.
 HÆMOCYTOTOMETERS, 274.
 Hæmoglobin, 274.
 Hartley's Broth Culture Medium, 286.
 Hayem's Solution, 274.
 Hay's Sulphur Test for Bile Salts, 267.
 Health Prescription, Definition of, 222.
 Herbarium Prize, 7.
 Hexæstrol, 307.
 Homœopathic Pharmacy, 77.
 Hormones, 304.
 Horse, Dosage Table for, 309.
 Hydrogen Ion Concentration, 156.
 Hydrometers, 161.
 Hydrometers, Relation between Degrees Twaddell, Degrees Baumé and Specific Gravity, 163.
 IMMUNOLOGY, 290.
 Imperial Weights and Measures, Conversion of, to Metric, 144, 150, 153.
 Incompatibility in Prescriptions, 27.
 Indican in Urine, Test for, 269.
 Infants, Feeding of, 300.
 Injections, Types of, 75.
 Inspectors, 5.
 Insufflations, 51.
 Insulin, 307.
 Intermediate Examination, 9.
 Iodine Test for Bile Pigments in Urine, 267.
 Iso-Propyl Alcohol Regulations, 234.
 Isotonic Solutions, Preparation of, 74.
 JACOB BELL SCHOLARSHIP, 7.
 Jellies, Preparation of, 58.
 Justices' Licences, 231.
 L.H., 305.
 Lactogenic Hormone of Pituitary, 305.
 Lactose in Urine, 270.
 Lange's Colloidal Gold Test, 278.
 Latin, Pharmaceutical, 14.
 Leucocyte Count, 274.
 Leverhulme Scholarships, 7.
 Library, 2, 6, 7.
 Library, Student's, 8.
 Litre, Weight of, 143.
 Liver Extracts, 308.
 Loeffler's Methylene Blue, 289.

- Logarithms, 425, 426.
 Luteinising Substances, 305.
- MACCONKEY'S MEDIUM, 287.**
 Manchester Pharmaceutical Association
 Scholarship, 7.
 Materia Medica, 324.
 Measures, Manipulation of, 17.
 Measures of Length, Metric and
 Imperial, 152.
 Measures, Types of, 16.
 Meat Extract Broth Culture Medium,
 286.
 Medical Benefit, Definition of, 238.
 Medicated Wines, 231.
 Methyl Violet Medium, 287.
 Methylated Spirits, 165.
 Methylated Spirits, Industrial, 232.
 Methylated Spirits, Mineralised, 232.
 Methylated Spirits, Regulations Govern-
 ing Manufacture and Sale of, 232,
 235.
 Metric and Imperial Equivalents for
 Trade Purposes, 149.
 Metric Weights and Measures, Con-
 version of, to Imperial, 146, 149,
 153.
 Milk, Composition of, 293.
 Milk, Humanised, 300.
 Minerals, Essential, in Foods, 294.
 Mixtures, Dispensing of, 20.
 Mortars, Types of, 17.
 Muir's Mordant, 289.
 Murexide Test for Calculi in Urine, 268.
 Museum, 3.
- NATIONAL HEALTH INSURANCE ACTS,**
 237.
 Neisser's Stain, 289.
 Nicotinamide, 298, 303.
 Nicotinic Acid, 298, 303.
 Nottingham University Student Scholar-
 ships, 7.
 Nutrient Agar Medium, 286.
 Nutrient Broth Culture Medium, 286.
 Nutrition Department of the Pharmaco-
 logical Laboratories, 2.
 Nylander's Reagent, 271.
- OBESITY, DIET IN, 301.**
 Oculents, Preparation of, 62.
 Estradiol, 307.
 Estradiol Monobenzoate, 307.
 Estrin, 307.
 Estriol, 307.
 Estrogens, 307.
 Estrone, 307.
 Oil-in-Water Emulgents, 35.
 Ointment Bases, 59.
 Ointments, Dispensing of, 58.
 Old Tuberculin, 292.
 Orphan Fund, 3.
 Ovarian Hormones, 307.
- pH VALUES OF BODY FLUIDS, 160.**
 pH Values, Determination of, 156.
 pH Values, Optimum, for Enzymes, 160.
- Pancreas, 307.
 Pantothenic Acid, 299.
 Parathyroid Glands, 306.
 Parenteral Solutions, Dispensing of, 72.
 Parents, Advice to, 8.
 Pastes, Preparation of, 58.
 Pastilles, Preparation of, 57.
 Pathogenic Organisms, 285.
 Pentoses in Urine, 270.
 Peptone Sugar Medium, 287.
 Percentage Solutions, 76.
 Pereira Medal, 6.
 Pessaries, Preparation of, 62.
 Pestle, Manipulation of, 18.
 Pestles, Types of, 18.
 Petrie Trust Bursary, 7.
 Pettenkofer's Test for Bile Salts, 267.
 Pharmaceutical Analysis, Post-graduate
 Diploma, 3.
 Pharmaceutical Chemist Qualifying
 Examination, 9.
 Pharmaceutical Distribution Committee
 (N.H.I.), 239.
 Pharmaceutical Journal, 2.
 Pharmaceutical Pocket Book, 2.
 Pharmaceutical Society, Activities of, 1.
 Pharmaceutical Society, College of, 3.
 Pharmaceutical Society, History of, 1.
 Pharmaceutical Society, North British
 Branch, 1.
 Pharmaceutical Society, Publications of,
 2.
 Pharmaceutical Society, Statutory Obli-
 gations, 5.
 Pharmacist, Definition of, 186.
 Pharmacological Laboratories, 2, 3.
 Pharmacopoeia Commission, 2.
 Pharmacy Acts, 5.
 Pharmacy as a Career, 8, 13.
 Pharmacy and Medicines Act, 1941, 209.
 Pharmacy and Poisons Act, 1933, 5, 186.
 Pharmacy, Science of, 13.
 Phenylhydrazine Test for Sugar in
 Urine, 271.
 Pigs, Dosage Table for, 309.
 Pill Coatings, 45.
 Pill Excipients, 39.
 Pills, Dispensing of, 39.
 Pituitary, Anterior Lobe, 304.
 Pituitary Body, 304.
 Pituitary Hormones, 304.
 Pituitary, Posterior Lobe, 305.
 Plasters, Preparation of, 66.
 Poisoning, Treatment of, 244, 249.
 Poisons, Antidotes to, 246.
 Poisons (Colouring) Rules, 1936, 192.
 Poisons, Exemptions, 199.
 Poisons List, 195.
 Poisons, Listed Sellers, Requirements
 Applying to, 205.
 Poisons, Medicinal and Fatal Doses of,
 260.
 Poisons Schedules, 188, 197.
 Post-Graduate Courses, 3.
 Powders, Dispensing of, 48.
 Pregnenediol, 308.
 Pregneninonol, 308.
 Privileges of Members of the Society, 6.
 Privileges of Student-Associates, 6.

Prizes, 4, 6, 7.
 Progesterone, 308.
 Prolactin, 305.
 Prolan A, 305.
 Prolan B, 305.
 Proof Spirit, 165.
 Protection of Animals Act, 1911, 243.
 Proteins, Biological Value of, 294.
 Protozoa, 290.
 Publications of the Pharmaceutical Society, 2.
 Pupil, Advice to, 8.
 Pupilage, Period of, 8.
 Pyridoxine, 299.

Quarterly Journal of Pharmacy and Pharmacology, 2.

RAMMELL STUDENTSHIP, 6.
 Red Cell Count, 274.
 Register of Pharmaceutical Chemists and Chemists and Druggists, 2.
 Registration, 5.
 Research Laboratories, 2, 3.
 Revision Committee, v.
 Rheumatic Fever, Diet in, 301.
 Riboflavin, 298, 303.
 Rothera's Test, 265.

SAFRANIN, 288.
 Salicylsulphonic Acid Test for Albumin in Urine, 266.
 Sampling Officers, Powers of, 229.

Schick Test Control, 291.
 Schick Test Toxin, 291.
 Schlesinger's Test for Urobilin in Urine, 273.
 Scholarships, 4, 6, 7.
 School of Pharmacy, 3, 4.
 Scientific Meetings, 2.
 Sedimentation Rate of Blood, 275.
 Serum Calcium, 306.
 Sheep, Dosage Table for, 309.
 Shops Acts, 1912-1936, 240.
 Shops, Inspection of, 5.
 Shops (Sunday Trading Restriction) Act, 241.
 Sikes's Hydrometer, 162.
 Signs used in Prescriptions, 145.
 Skin Sterilisation, 292.
 Sloppy Agar Medium, 286.
 Sodium Hypobromite Test for Urea in Urine, 272.
 Solubilities, Table of, 169.
 Specific Gravity, Adjustment of, 186.
 Specific Gravity, Determination of, 161.
 Spirits, Acts and Regulations Relating to, 230.
 Spirits (Medical Purposes) Regulations, 1934, 231.
 Spirits Rebate, 231.
 Spores, Bacterial, 284.
 Spores, Staining of, 289.
 Stains for Bacteria, 288.
 Stains, Removal of, 181.

Statutory Committee, 5, 187.
 Statutory Poisons, 187.
 Steam Pressure and Temperature Table, 70.
 Sterilisation, 67.
 Sterilisation, Emergency Method of, 72.
 Sterilisation by Heating with a Bactericide, 70.
 Sterilised Water, 75.
 Stilboestrol, 307.
 Stills, Use of by Chemists, 236.
 Stomach, Desiccated, 308.
 Stomach Tube, Use of, 244.
 Student-Associates, 6.
 Study Courses, 9.
 Sugar in Blood, 275.
 Sugar in Urine, Tests for, 269.
 Sulphated Fatty Alcohols, 37.
 Sunday Closing of Shops, 241.
 Suppositories, Preparation of, 62.
 Suppository Moulds, 62.
 Suprarenal Glands, 306.
 Surgical Dressings, Sterilisation of, 69.
 Surgical Instruments, Sterilising of, 292.
 "Sweets", Definition of, 231.
 Synonyms, Dictionary of, 342.

TABLET MACHINE, 54.
 Tablets, Compressed, 53.
 Tablets, Preparation of Granules, 54.
 Tampons, Preparation of, 66.
 Tellurite Medium, 287.
 Test Meals for Examination of Gastric Contents, 279.
 Testicular Hormone, 308.
 Testosterone, 308.
 Testosterone Propionate, 308.
 Therapeutic Substances Act, 226.
 Thermometric Equivalents, 182.
 Thiamine Hydrochloride, 297.
 Thioglycollate Medium, 286.
 Thymol Blue Test for HCl in Gastric Contents, 281.
 Thyroid Gland, 305.
 Thyrotrophic Hormone of Pituitary, 305.
 Thyroxine, 305.
 Tocopherol, 300.
 Tocopheryl Acetate, 303.
 Topfer's Test, 281.
 Toxins, 291.
 Trace Elements in the Diet, 294.
 Trade Names, Dictionary of, 342.
 Troy Weight, 150, 151.
 Trypsinogen, 307.
 Tubercle Bacilli, Staining of, 289.
 Twaddell's Hydrometer, 161.
 Tyndallisation, 72.

UFFELMAN'S TEST FOR LACTIC ACID, 280.
 Universal Indicators, 159.
 University of London, 4.
 Urea in Blood, 276.
 Urea, Tests for in Urine, 272.
 Uric Acid in Urine, 270.
 Urine, Examination of, 263.
 Urobilin in Faeces, 282.
 Urobilin in Urine, 273.

- VACCINES, 291.
Venereal Diseases Act, 1917, 242.
Veterinary Posological Table, 309.
Viricides, 292.
Viruses, 290.
Vitamin A, 296, 302.
Vitamin A Requirements, 297, 302.
Vitamin B₁, 297, 303.
Vitamin B₁, Deficiency Diseases, 298.
Vitamin B₁₂, 298, 303.
Vitamin B₆, 299.
Vitamin B Group, 297, 303.
Vitamin C, 299, 303.
Vitamin D, 300, 303.
Vitamin E, 300, 303.
Vitamin G, 298.
Vitamin K, 300.
Vitamin P, 299.
Vitamin Contents of Official Preparations, 302.
Vitamin Requirements for Health, 296, 302.
Vitamins, Body Reserves of, 296.
WAR AID FUND, 4.
War Auxiliary Benevolent Fund, 4.
Warranty Defence, 229.
Water-in-Oil Emulgents, 37.
Weights and Measures, Foreign, 145.
Weights and Measures, Imperial, 144.
Weights and Measures, Metric, 146.
White Cell Count, 274.
Wine, Definition of, 230.
Wines, Acts and Regulations Relating to, 230.
Wool Alcohols, 37.
YOUNG PERSONS, EMPLOYMENT OF, 241.
ZIEHL NEELSEN STAIN, 289.

LOGARITHMS

											Mean Differences.									
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	4	8	12	17	21	25	29	33	37	
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	11	15	19	23	26	30	34	
12	0792	0828	0866	0899	0934	0969	1004	1038	1072	1106	3	7	10	14	17	21	24	28	31	
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29	
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	27	
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	3	6	8	11	14	17	20	22	25	
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	5	8	11	13	16	18	21	24	
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	2	5	7	10	12	15	17	20	22	
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	16	19	21	
19	2788	2810	2833	2855	2878	2900	2923	2945	2967	2989	2	5	7	9	11	13	16	18	20	
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19	
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18	
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17	
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17	
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16	
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15	
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15	
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	14	
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14	
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13	
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13	
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12	
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12	
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12	
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11	
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11	
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11	
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10	
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10	
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10	
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10	
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9	
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9	
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9	
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9	
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9	
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8	
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8	
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8	
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8	
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8	
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8	
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7	
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7	
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7	

LOGARITHMS

	0	1	2	3	4	5	6	7	8	9	Mean Differences.								
											1	2	3	4	5	6	7	8	9
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	6	7	
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	6	7	
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	1	2	3	4	5	6	7	
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	5	6	7	
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	5	6	7	
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	5	6	7	
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	5	6	7	
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	4	5	6	7	
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	4	5	6	7	
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	4	5	6	7	
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	4	5	6	7	
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	4	5	6	7	
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	4	5	6	7	
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	4	5	6	7	
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	3	4	5	6	7	
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	3	4	5	6	7	
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	3	4	5	6	7	
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	3	4	5	6	7	
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	3	4	5	6	7	
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	3	4	5	6	7	
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	3	4	5	6	7	
76	8809	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	3	4	5	6	7	
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	3	4	5	6	7	
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	3	4	5	6	7	
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	3	4	5	6	7	
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	3	4	5	6	7	
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	3	4	5	6	7	
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9185	1	1	2	3	4	5	6	7	
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	3	4	5	6	7	
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	3	4	5	6	7	
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	3	4	5	6	7	
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	0	1	2	3	4	5	6	7	
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	2	3	4	5	6	7	
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	2	3	4	5	6	7	
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	2	3	4	5	6	7	
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	2	3	4	5	6	7	
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	2	3	4	5	6	7	
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	2	3	4	5	6	7	
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	2	3	4	5	6	7	
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	2	3	4	5	6	7	
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	2	3	4	5	6	7	
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	2	3	4	5	6	7	
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	2	3	4	5	6	7	
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	2	3	4	5	6	7	
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	0	1	2	3	4	5	6	7	

ANTILOGARITHMS

	0	1	2	3	4	5	6	7	8	9	Mean Differences.								
											1	2	3	4	5	6	7	8	9
-00	1000	1002	1005	1007	1009	1012	1014	1016	1019	1021	0	0	1	1	1	1	2	2	2
-01	1023	1026	1028	1030	1033	1035	1038	1040	1042	1045	0	0	1	1	1	1	2	2	2
-02	1047	1050	1052	1054	1057	1059	1062	1064	1067	1069	0	0	1	1	1	1	2	2	2
-03	1072	1074	1076	1079	1081	1084	1086	1089	1091	1094	0	0	1	1	1	1	2	2	2
-04	1096	1099	1102	1104	1107	1109	1112	1114	1117	1119	0	0	1	1	1	1	2	2	2
-05	1122	1125	1127	1130	1132	1135	1138	1140	1143	1146	0	1	1	1	1	1	2	2	2
-06	1148	1151	1153	1156	1159	1161	1164	1167	1169	1172	0	1	1	1	1	2	2	2	2
-07	1175	1178	1180	1183	1186	1189	1191	1194	1197	1199	0	1	1	1	1	2	2	2	2
-08	1202	1205	1208	1211	1213	1216	1219	1222	1225	1227	0	1	1	1	1	2	2	2	2
-09	1230	1233	1236	1239	1242	1245	1247	1250	1253	1256	0	1	1	1	1	2	2	2	2
-10	1259	1262	1265	1268	1271	1274	1276	1279	1282	1285	0	1	1	1	1	2	2	2	2
-11	1288	1291	1294	1297	1300	1303	1306	1309	1312	1315	0	1	1	1	2	2	2	2	2
-12	1318	1321	1324	1327	1330	1334	1337	1340	1343	1346	0	1	1	1	2	2	2	2	2
-13	1349	1352	1355	1358	1361	1365	1368	1371	1374	1377	0	1	1	1	2	2	2	2	2
-14	1380	1384	1387	1390	1393	1396	1400	1403	1406	1409	0	1	1	1	2	2	2	2	2
-15	1413	1416	1419	1422	1426	1429	1432	1435	1439	1442	0	1	1	1	2	2	2	2	2
-16	1445	1449	1452	1455	1459	1462	1466	1469	1472	1476	0	1	1	1	2	2	2	2	2
-17	1479	1483	1486	1489	1493	1496	1500	1503	1507	1510	0	1	1	1	2	2	2	2	2
-18	1514	1517	1521	1524	1528	1531	1535	1538	1542	1545	0	1	1	1	2	2	2	2	2
-19	1549	1552	1556	1560	1563	1567	1570	1574	1578	1581	0	1	1	1	2	2	2	2	2
-20	1585	1589	1592	1596	1600	1603	1607	1611	1614	1618	0	1	1	1	2	2	2	2	2
-21	1622	1626	1629	1633	1637	1641	1644	1648	1652	1656	0	1	1	1	2	2	2	2	2
-22	1660	1663	1667	1671	1675	1679	1683	1687	1690	1694	0	1	1	1	2	2	2	2	2
-23	1698	1702	1706	1710	1714	1718	1722	1726	1730	1734	0	1	1	1	2	2	2	2	2
-24	1738	1742	1746	1750	1754	1758	1762	1766	1770	1774	0	1	1	1	2	2	2	2	2
-25	1778	1782	1786	1791	1795	1799	1803	1807	1811	1816	0	1	1	1	2	2	2	2	2
-26	1820	1824	1828	1832	1837	1841	1845	1849	1854	1858	0	1	1	1	2	2	2	2	2
-27	1862	1866	1871	1875	1879	1884	1888	1892	1897	1901	0	1	1	1	2	2	2	2	2
-28	1905	1910	1914	1919	1923	1928	1932	1936	1941	1945	0	1	1	1	2	2	2	2	2
-29	1950	1954	1959	1963	1968	1972	1977	1982	1986	1991	0	1	1	1	2	2	2	2	2
-30	1995	2000	2004	2009	2013	2018	2023	2028	2032	2037	0	1	1	1	2	2	2	2	2
-31	2042	2046	2051	2056	2061	2065	2070	2075	2080	2085	0	1	1	1	2	2	2	2	2
-32	2089	2094	2099	2104	2109	2113	2118	2123	2128	2133	0	1	1	1	2	2	2	2	2
-33	2138	2143	2148	2153	2158	2163	2168	2173	2178	2183	0	1	1	1	2	2	2	2	2
-34	2188	2193	2198	2203	2208	2213	2218	2223	2228	2233	0	1	1	1	2	2	2	2	2
-35	2239	2244	2249	2254	2259	2263	2270	2275	2280	2286	0	1	1	1	2	2	2	2	2
-36	2291	2296	2301	2307	2312	2317	2323	2328	2333	2338	0	1	1	1	2	2	2	2	2
-37	2344	2350	2355	2360	2366	2371	2377	2382	2387	2392	0	1	1	1	2	2	2	2	2
-38	2399	2404	2410	2415	2421	2427	2432	2438	2443	2448	0	1	1	1	2	2	2	2	2
-39	2455	2460	2466	2472	2477	2483	2489	2495	2500	2506	0	1	1	1	2	2	2	2	2
-40	2512	2518	2523	2529	2535	2541	2547	2553	2558	2564	0	1	1	1	2	2	2	2	2
-41	2570	2576	2582	2588	2594	2600	2606	2612	2618	2624	1	1	1	2	2	2	2	2	2
-42	2630	2636	2642	2648	2655	2661	2667	2673	2679	2685	1	1	1	2	2	2	2	2	2
-43	2692	2698	2704	2710	2716	2723	2729	2735	2742	2748	1	1	1	2	2	2	2	2	2
-44	2754	2761	2767	2773	2780	2786	2793	2799	2805	2812	1	1	1	2	2	2	2	2	2
-45	2818	2825	2831	2838	2844	2851	2858	2864	2871	2877	1	1	1	2	2	2	2	2	2
-46	2884	2891	2897	2904	2911	2917	2924	2931	2938	2944	1	1	1	2	2	2	2	2	2
-47	2951	2958	2965	2972	2979	2985	2992	2999	3006	3013	1	1	1	2	2	2	2	2	2
-48	3020	3027	3034	3041	3048	3055	3062	3069	3076	3083	1	1	1	2	2	2	2	2	2
-49	3090	3097	3105	3112	3119	3126	3133	3141	3148	3155	1	1	1	2	2	2	2	2	2

ANTILOGARITHMS

	0	1	2	3	4	5	6	7	8	9	Mean Differences.								
											1	2	3	4	5	6	7	8	9
-50	3162	3170	3177	3184	3192	3199	3206	3214	3221	3228	1	1	2	3	4	4	5	6	7
-51	3236	3243	3251	3258	3266	3273	3281	3289	3296	3304	1	2	2	3	4	5	5	6	7
-52	3311	3319	3327	3334	3342	3350	3357	3365	3373	3381	1	2	2	3	4	5	5	6	7
-53	3388	3396	3404	3412	3420	3428	3436	3443	3451	3459	1	2	2	3	4	5	5	6	7
-54	3467	3475	3483	3491	3499	3507	3515	3522	3530	3538	1	2	2	3	4	5	5	6	7
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-66	4571	4581	4592	4603	4613	4624	4634	4645	4656	4667	1	2	3	4	5	6	7	9	10
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-88	7586	7603	7621	7638	7656	7674	7691	7709	7727	7745	2	4	5	7	9	11	12	14	16
-89	7762	7780	7798	7816	7834	7852	7870	7889	7907	7925	2	4	5	7	9	11	13	14	16
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-95	8913	8933	8954	8974	8995	9016	9036	9057	9078	9099	2	4	6	8	10	12	15	17	19
-96	9120	9141	9162	9183	9204	9226	9247	9268	9290	9311	2	4	6	8	11	13	15	17	19
-97	9333	9354	9376	9397	9419	9441	9462	9484	9506	9528	2	4	7	9	11	13	15	17	20
-98	9550	9572	9594	9616	9638	9661	9683	9705	9727	9750	2	4	7	9	11	13	16	18	20
-99	9772	9795	9817	9840	9863	9886	9908	9931	9954	9977	2	5	7	9	11	14	16	18	20

